INSTRUCTION MANUAL

MODEL 801
50 MHz PULSE GENERATOR

WAVETEK

WAVETEK SAN DIEGO, INC.

9045 Balboa Ave., San Diego, CA 92123

INSTRUCTION MANUAL

MODEL 801
50 MHz PULSE GENERATOR

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Manual Revision 5/84
Instrument Release P

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SAFETY

This instrument is wired for earth grounding via the facility power wiring. Do not bypass earth grounding with two wire extension cords, plug adapters, etc.

BEFORE PLUGGING IN the instrument, comply with installation instructions.

MAINTENANCE may require power on with the instrument covers removed. This should be done only by qualified personnel aware of the electrical hazards.

The instrument power receptacle is connected to the instrument safety earth terminal with a green/yellow wire. Do not alter this connection. (Reference: ⏚ or ⚠ stamped inside the rear panel near the safety earth terminal.)

WARNING notes call attention to possible injury or death hazards in subsequent operations.

CAUTION notes call attention to possible equipment damage in subsequent operations.

SECTION 1
GENERAL DESCRIPTION

1.1 THE MODEL 801

The Model 801 is a 50 MHz general purpose laboratory pulse generator. The instrument gives you full control in primary pulse triggering and shaping plus simultaneous TTL, ECL, $\overline{\text{ECL}}$ and sync pulses. The primary pulse output has controllability in offset and independent rise/fall durations, as well as pulse width, pulse delay and a choice of positive, negative or complementary outputs. The TTL, ECL and $\overline{\text{ECL}}$ are of fixed levels and rise times that are standard for use with compatible devices. The primary pulse has minimum rise and fall times of 7 ns and a maximum of 250 ms.

The output is ±20 volts with 50Ω source impedance which provides ±10 volts into a 50Ω load. Upper and lower pulse levels are fully adjustable through ±20 volts.

External triggering can be set to any point of the rising or trailing edge of the trigger signal. Single pulses or pulse pairs may be triggered; pulse width may be trigger controlled; continuous pulses may be gated and a precise number of pulses may be triggered for a 'burst' output. Manual and external triggering is indicated by an LED on the front panel for rapid visual set of trigger level.

1.2 SPECIFICATIONS

1.2.1 Versatility

Five Simultaneous Pulse Outputs
Fixed level ECL, $\overline{\text{ECL}}$, TTL and sync pulses and a pulse with variable amplitude and variable rise/fall times. Pulses available over a 5 Hz to 50 MHz frequency range (200 ms to 20 ns periods).

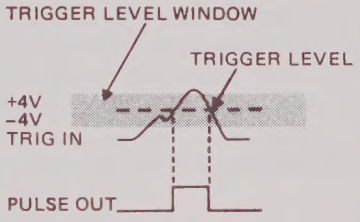
Operational Modes
Continuous: Generator oscillates continuously at selected frequency.

Triggered: Generator quiescent until triggered by external signal or front control, then generates one pulse.

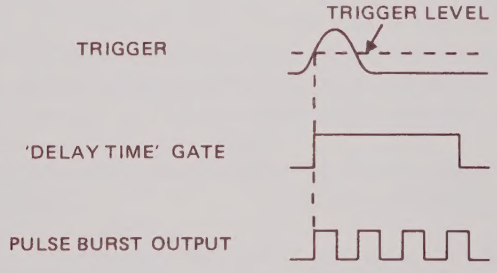
Gated: As triggered mode, except generator oscillates for the duration of the external signal.

Double Pulse: Continuous, trigger and gate, as above, except two pulses for each period. Space between pulses of double pulse controlled by delay control. Double pulse at all outputs except sync.

External Width: External signal at trigger input and trigger level control determine output pulse width and period as shown.



Trigger Burst: External trigger starts internal gate (delay time) for pulse burst (1 to 100 pulse range) as shown.



1.2.2 Pulse Outputs

Variable Amplitude Pulse
Upper and lower pulse levels are independently adjustable. Pulse dynamic range is ±20V into an open circuit from the 50Ω source. The pulse is 20V p-p maximum, 1V p-p minimum. Into a 50Ω termination, dynamic range is ±10V, maximum pulse 10V p-p, minimum pulse 0.5V p-p.

Overshoot and ringing is less than ±(5% of amplitude setting +100 mV) into 50Ω load.

Preshoot is less than ±(5% of amplitude setting +100 mV) into 50Ω load.

Fixed (ECL, $\overline{\text{ECL}}$, TTL) Pulses
Pulse levels for 50Ω loading as shown:

ECL, $\overline{\text{ECL}}$ Transition Time: < 6 ns.

TTL Transition Time: < 10 ns.

Sync Pulse
Sync pulse is 0 to at least +1V from a 50Ω source.

Normal/Complement Control
Normal pulse or its complement is selected. The normally quiescent and active levels are reversed in complement format. This control affects all outputs except sync pulse.

1.2.3 Time Domain

Period
Period range is from less than 20 ns to greater than 200 ms in 7 overlapping ranges.

Period jitter is less than 0.1% plus 50 picoseconds.

Width
Width range is from less than 10 ns to 100 ms in 7 overlapping ranges. Maximum duty cycle is 70% for periods to 200 ns, decreasing to 50% for 20 ns periods. Range switch also has a square wave detent (⊓⊔).

⊓⊔ duty cycle is 50 ±4% to 2 μs period changing to 50 ±15% at 20 ns period.

Width jitter is less than 0.1% plus 50 picoseconds.

Sync pulse duty cycle is 50 ±4% of pulse period to 2 μs period, changing to 50 ±15% at 20 ns period except in trigger and external width modes, in which case it is determined by the trigger signal.

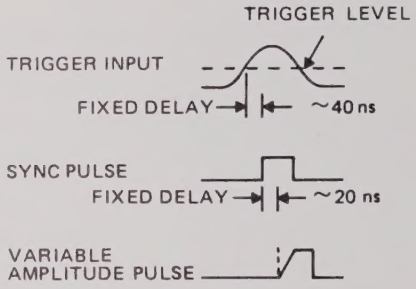
Transition Time
For variable amplitude pulse only. Independently adjustable leading and trailing edges from less than 7 ns (5 ns typical) to 250 ms in 7 overlapping decade ranges (measured from 10 to 90% points). Verniers give 50:1 adjustment on all ranges except 5 ns, which gives 25:1.

Linearity: For transition greater than 10 ns ±5% between 10 to 90% points on pulse.

Delay
Pulse occurrence can be delayed from less than 10 ns to 100 ms with respect to the sync pulse. Maximum duty cycle is 70% for periods to 200 ns, decreasing to 30% for 20 ns periods.

Delay jitter is less than 0.1% plus 50 picoseconds.

Fixed delay is as shown:



1.2.4 Input Characteristics

External Trigger
The external signal required to trigger the generator has a minimum amplitude of ±200 mV p-p to 5 MHz increasing to ±600 mV p-p to 50 MHz (from 50Ω source) and a maximum amplitude of ±10V with a minimum width of 10 ns.

Input impedance is approximately 1 kΩ in parallel with 22 pF

Triggering is selected to occur at either rising or falling edge of trigger signal; triggering level is adjustable to be between ±4V. An LED lights for approximately 100 ms for each external and manual trigger occurrence accepted.

1.2.5 General

Environmental
Specifications apply at 25°C ±5°C after 1 hour warm-up. Instrument will operate from 0°C to 50°C.

Dimensions
28.6 cm (11 ¼ in.) wide; 13.3 cm (5 ¼ in.) high; 29 cm (11 ¼ in.) deep.

Weight
5.4 kg (12 lb) net; 7.3 kg (16 lb) shipping.

Power
90 to 130V or 180 to 250V; 50 to 400 Hz; 60 watts nominal.

SECTION 2
INSTALLATION

2.1 MECHANICAL INSTALLATION

After unpacking the instrument, visually inspect all external parts for possible damage to connectors, surface areas, etc. If damage is discovered, file a claim with the carrier who transported the unit. The shipping container and packing material should be saved in case reshipment is required.

2.2 ELECTRICAL INSTALLATION

2.2.1 Power Connection

WARNING

To preclude injury or death due to shock, the third wire earth ground must be continuous to the facility power outlet. Before connecting to the facility power outlet, examine extension cords, autotransformers, etc., between the instrument and the facility power outlet for a continuous earth ground path. The earth ground path can be identified at the plug on the instrument power cord; of the three terminals, the earth ground terminal is the nonmatching shape, usually cylindrical.

CAUTION

To prevent damage to the instrument, check for proper match of line and instrument voltage and proper fuse type and rating.

NOTE

Unless otherwise specified at the time of purchase, this instrument was shipped from the factory with the power transformer connected for operation on a 108 to 132 Vac line supply and with a 0.6 amp fuse.

Conversion to other input voltages requires a change in rear panel fuse-holder voltage card position and fuse according to the following table and procedure.

Card Position	Input Vac	Fuse
100	90 to 110	0.6 amp
120	108 to 132	0.6 amp
220	198 to 242	0.3 amp
240	216 to 264	0.3 amp

1. Open fuse holder cover door and rotate fuse pull to left to remove the fuse.

2. Select operating voltage by orienting the printed circuit board to position the desired voltage on the top left side. Push the board firmly into its module slot.

3. Rotate the fuse-pull back into the normal position and insert the correct fuse into the fuse holder. Close the cover door.

4. Connect the ac line cord to the mating connector at the rear of the unit and the power source.

2.2.2 Signal Connections

Use 3 foot RG58U 50Ω shielded cables equipped with female BNC connectors to distribute input and output signals when connecting this instrument to associated equipment.

2.3 ELECTRICAL ACCEPTANCE CHECK

This checkout procedure verifies the generator operation. If a malfunction is found, refer to the Warranty in the front of this manual. A 2 channel oscilloscope and 50Ω coax cable are needed for this procedure (see figure 2-1).

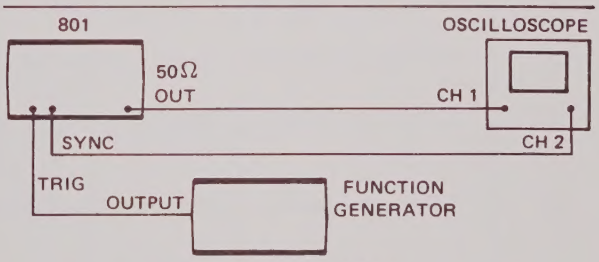


Figure 2-1. Initial Setup

Preset the pulse generator controls by setting the following switches to their white mark:

MODE
TRIGGER
PERIOD/RATE
DELAY
WIDTH
OUTPUT
TRANSITION TIME

Set the following controls to 12 o'clock:

TRIGGER LEVEL
VARIABLE PERIOD/RATE
VARIABLE DELAY
VARIABLE WIDTH
LOWER LEVEL
UPPER LEVEL
TRAILING EDGE
LEADING EDGE

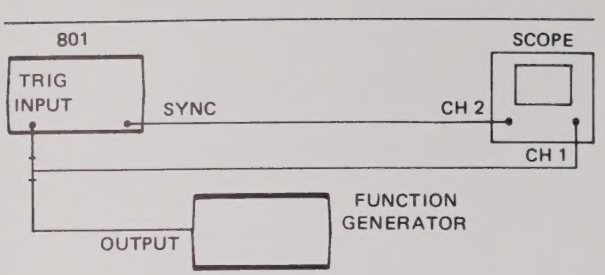


Figure 2-2. Second Setup

Set the function generator to supply a 1 kHz, ⩾ 5V triangle wave trigger.

Perform the steps in table 2-1. Only approximate values are required to verify operation.

Table 2-1. Performance Checkout

Step	Control	Position/Operation	Observation
1	POWER	In	CH 1: A near 0 volt dc level. (LEVEL control is not calibrated.) CH 2: 1.5 volt pulses.
2	LOWER LEVEL	Rotate ccw	Pulse base drops 20V.
3	UPPER LEVEL	Rotate ccw	Pulse upper level drops 20V.
4	UPPER LEVEL	Rotate cw. Make observation; then reposition for good display.	Pulse rises 20V, then rises 20V more while pulling the base up 20V. Base rises to 0V.
5	OUTPUT	COMP, then NORM	Set scope for one or two cycles. Observe the switching of duty time from 1st half cycle to 2nd half cycle.
6	WIDTH	Rotate ccw, then to 10 μs ▮ 100 μs	Duty time changes. (Use scope X 10 magnification to see narrow widths.)
7	WIDTH VARIABLE	Rotate ccw, then to 12 o'clock	Duty time decreases, then increases.
8	TRANSITION TIME	Rotate to 500 ns ▮ 5 μs	Slope of pulse edges increases.
9	LEADING EDGE	Rotate cw, then full ccw	Slope of leading edge decreases, then approaches vertical.
10	TRAILING EDGE	Rotate cw, then full ccw	Slope of trailing edge decreases, then approaches vertical.
11	DELAY	Rotate cw to 10 μs ▮ 100 μs	Pulse position changes within cycle time.
12	DELAY VARIABLE	Rotate ccw, then cw	Pulse position moves to left, then right.
13	PERIOD/RATE VARIABLE	Rotate cw, then to 12 o'clock	Period increases, then decreases.
14	MODE	CONT DBL	Two pulses instead of one.
15	DELAY VARIABLE	Rotate ccw, then cw, but maintain double pulse	Pulse pairs move closer, then further apart.

Table 2-1. Performance Checkout (Continued)

Step	Control	Position/Operation	Observation
16	WIDTH VARIABLE	Rotate ccw, then to 12 o'clock, but maintain double pulse	Duty time of each pulse of pulse pair decreases, then increases.
17	MODE	TRIG	Pulse delayed from sync leading edge.
18	MODE	TRIG DBL	Two pulses instead of one.
19	50Ω OUT	Remove cable; place on ECL connector	ECL double pulse output.
20	ECL	Remove cable; place on $\overline{\text{ECL}}$ connector	$\overline{\text{ECL}}$ double pulse output complement of previous output.
21	$\overline{\text{ECL}}$	Remove cable; place on TTL connector	TTL double pulse output.
		Change to setup in figure 2-2. Trigger scope on trigger signal.	
22	TRIGGER	⎍	Sync rises on trigger falling edge.
23	TRIGGER	⎍	Sync rises on trigger rising edge.
24	TRIGGER LEVEL	Rotate cw and ccw, then to white mark	Sync pulse triggers at different levels on triangle trigger signal.
		Change to setup in figure 2-1. Set trigger source to 400 Hz.	
25	MODE	GATE	Several pulses from the pulse generator for each gate cycle.
26	MODE	GATE DBL	Two pulses for each one in previous step. (WIDTH VARIABLE may need adjusting.)
27	MODE	EXT WIDTH	– – –
28	TRIGGER LEVEL	Vary level; return to white mark	Pulse width varies.
29	MODE	TRIG BURST	– – –
30	DELAY	100 μs ▮ 1 ms	– – –
31	DELAY VARIABLE	Rotate ccw, then cw	Decreases, then increases the number of pulses per trigger cycle.
32	TRIGGER	MAN TRIG	– – –
33	MAN TRIG	Press switch	The pulse set of the previous step for each press of MAN TRIG.

SECTION 3
OPERATION

3.1 CONTROLS AND CONNECTORS

The generator controls and connections are shown in figure 3-1 and keyed to the following descriptions.

(1) **MODE Switch** – Selects one of the following eight modes.

CONT – Continuous pulses at all output connectors.

TRIG – DC level at all outputs until a suitable trigger appears (see (2), (3)); then one or more pulses occur, depending on mode and control settings.

GATE – DC level at all outputs until a suitable trigger edge appears (see (2), (3)); then pulses occur until the trigger signal transverses the generator trigger level again.

EXT WIDTH – DC level at all outputs until a suitable trigger appears (see (2), (3)); then a pulse occurs which has the duration of the trigger signal.

TRIG BURST – DC level at all outputs until a suitable trigger appears (see (2), (3)) to trigger a gate time (5); then a fixed number of pulses occur as determined by (4) and (5)

CONT DBL – As for CONT except two pulses occur for each pulse period. Time to second pulse is set by (5)

TRIG DBL – As for TRIG except two pulses occur in the one pulse period. Time to second pulse is set by (5).

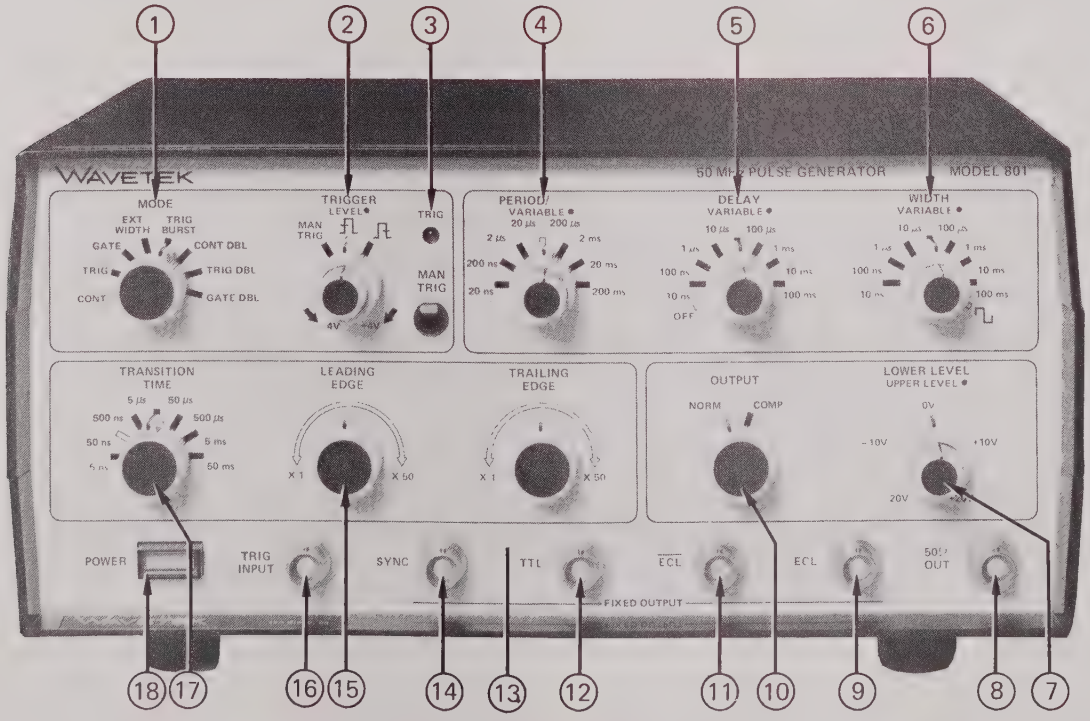
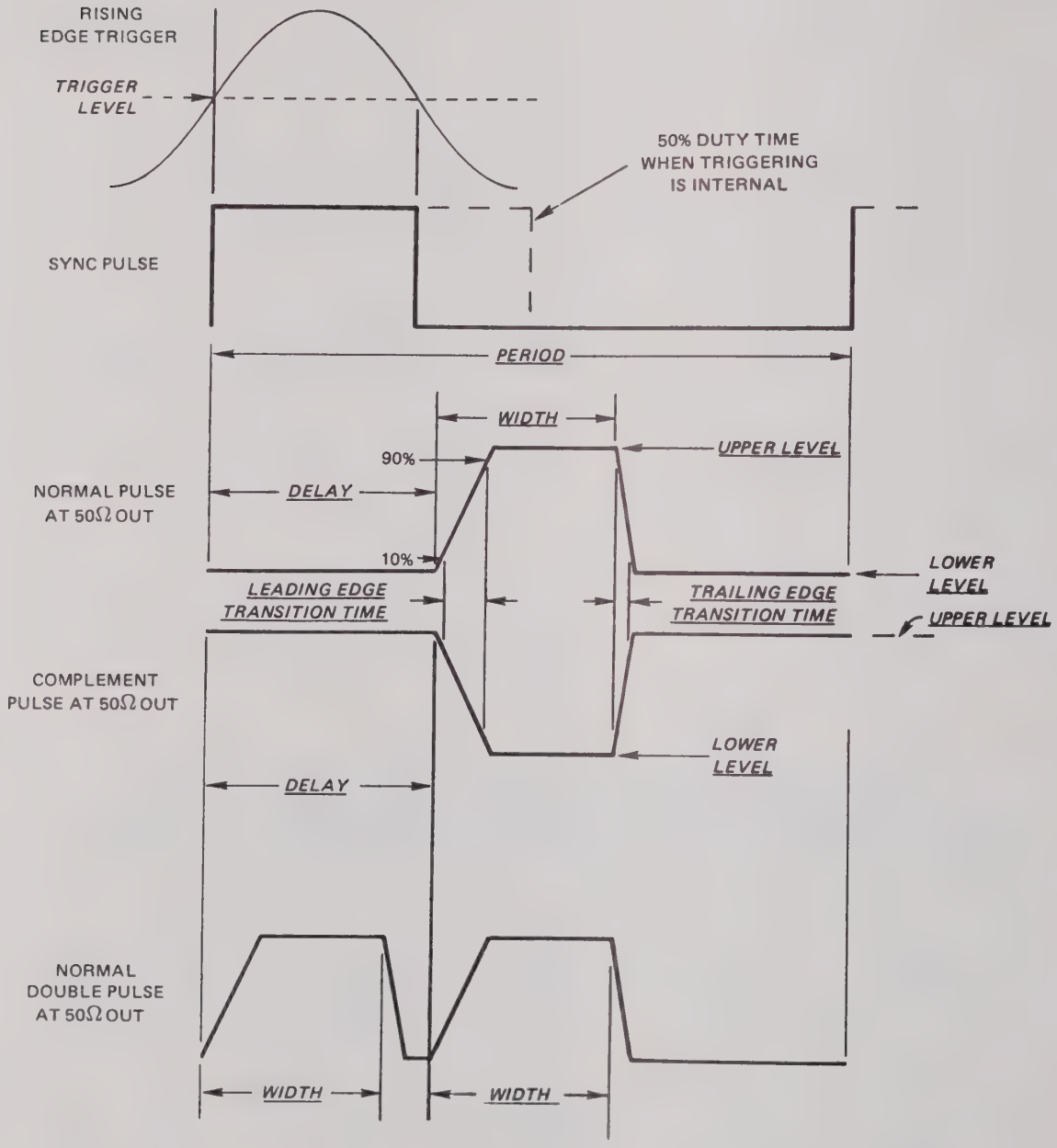


Figure 3-1. Controls and Connections



NOTE: Underline indicates a front panel controlled parameter.

Figure 3-2. Pulse Parameters

GATE DBL – As for GATE except two pulses occur for each pulse period. Time to second pulse is set by (5).

(2) **TRIGGER Switch** – Selects one of three trigger methods: manual, an external trigger signal's rising edge or an external trigger signal's falling edge. The external trigger signal is applied at (16).

LEVEL Control – Inner knob sets acceptance threshold for trigger signal at (16).

(3) **MAN TRIG Switch** – Supplies a trigger with a duration that equals the time the switch is held down. Output depends on the mode selected (see (1)).

TRIG Indicator – An LED which lights approximately 100 ms for each trigger signal accepted.

(4) **PERIOD/RATE Switch** – Selects one of seven ranges of pulse period. Calibrated in seconds and hertz.

VARIABLE Control – Varies the pulse period within the range selected by the outer knob. Clockwise increases the pulse period and decreases frequency.

(5) **DELAY Switch** – Selects one of seven ranges of pulse delay, time to second pulse of double pulses or length of burst, depending on mode setting. OFF position ensures minimum delay.

VARIABLE Control – Varies the delay time within the range selected by the outer knob. Clockwise increases the delay.

(6) **WIDTH Switch** – Selects one of seven ranges of pulse width or an approximate 50% duty cycle.

VARIABLE Control – Varies the pulse width within the range selected by the outer knob except in ⊓⊔.

(7) **LOWER LEVEL Control** – Outer knob sets the lower level of the 50Ω OUT pulse, which may be varied from –20 to +20 volts into an open circuit or –10 to +10 volts into a 50Ω termination. Maximum pulse height is 20 volts open circuit.

UPPER LEVEL Control – Inner knob sets the upper level of the 50Ω OUT pulse. Upper level range is identical to that stated for the lower level.

(8) **50Ω OUT Connector** – The main output of the generator. Pulses from this output may be controlled in level and transition time as well as frequency and width.

(9) **ECL Connector** – An output with an emitter-coupled-logic level pulse whose occurence and duration are controllable. Levels are –1.8V quiescent, –0.9V active.

(10) **OUTPUT Switch** – Selects a normal pulse or its complement which swaps the active and quiescent levels. Affects all outputs, except SYNC.

(11) **$\overline{\text{ECL}}$ Connector** – An output like the ECL output (9) except active and quiescent levels are reversed.

(12) **TTL Connector** – An output with a transistor-transistor-logic level pulse whose occurence and duration are controllable. Level is < 0.4V quiescent, > 2.4V active into a 50Ω termination.

(13) **TRAILING EDGE Control** – Varies the duration of the 50Ω OUT pulse trailing edge. Duration range is set by (17). Clockwise rotation increases edge time. Full cw exceed upper value of the selected range. Trailing edge time is not part of WIDTH time.

(14) **SYNC Connector** – An output with a pulse of 0V to > 0.5V into 50Ω termination and a square wave when the generator is in a continuous mode (see (1)). In other modes, width is determined by the time between initial transition of the trigger signal through the trigger level to the trailing transition.

(15) **LEADING EDGE Control** – Same as (13) but varies the duration of the leading edge of the 50Ω OUT pulse. Leading edge time is part of WIDTH time.

(16) **TRIG INPUT Connector** – Accepts an external signal to trigger the generator. Triggers on rising or falling edge of input as determined by (2). See paragraph 1.2.3 for input specifications.

(17) **TRANSITION TIME Switch** – Selects one of seven ranges for 50Ω OUT pulse rise and fall durations. Actual durations within a range are set by (13) and (15).

(18) **POWER Switch** – Pulse generator on/off switch.

3.2 NOTES ON OPERATION

Operational modes are described in paragraph 3.1 under the mode switch. The pulse itself may be shaped in width, leading and trailing edge transition times, upper level, lower level, frequency of occurrence (period) and delay with

respect to its sync pulse. These pulse parameters are shown in figure 3-2. Specific setups for each mode are given in paragraph 3.3.

3.2.1 White Marks

When first becoming familiar with the 801, the white mark settings are handy. The white mark settings for the front panel switches will always give a 5k to 50 kHz sync signal when power is on. The same settings will give 50% duty time, TTL, ECL, $\overline{\text{ECL}}$ and 50Ω OUT pulses; the LOWER LEVEL/UPPER LEVEL control may need adjusting to observe the 50Ω OUT on an oscilloscope. Once the output is observed, each control can be adjusted and observed until the desired result is obtained.

3.2.2 Pulse Width, Transition and Delay

Narrow duty cycle pulses require the NORMAL OUTPUT while greater than 70% duty cycle pulses require the COMP OUTPUT setting. Pulse width plus trailing edge time plus delay time settings should not exceed the period time. (See figure 3-2.) The sum of width, trailing edge and delay actually must be somewhat less than period time by an amount that depends upon the period time selected. Therefore, when the sum of the desired width, trailing edge and delay time exceeds 70% of the period time, the pulse should be observed to make sure it is as desired.

The 50% duty time width setting (⊓⊔) is meant to be used in continuous mode. Other modes result in the following default conditions.

Mode Selected	Output
TRIG ⊓⊔	A triggered 10 ns pulse
CONT DBL ⊓⊔	A continuous output of paired 10 ns pulses
TRIG DBL ⊓⊔	A triggered output of paired 10 ns pulses
GATE DBL ⊓⊔	A gated output of paired 10 ns pulses

3.2.3 ECL Termination

Figure 3-3 shows a 5.2/0 volt 50Ω ECL termination. Similar 50Ω terminations can be made for ECL circuits with other voltage arrangements.

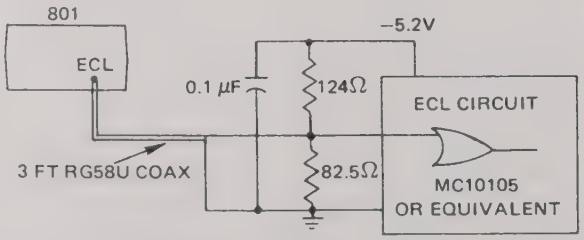


Figure 3-3. ECL Termination

3.2.4 Output Terminations

Only 50Ω RG58U cable should be used to connect the 801 to the circuit under test. A 50Ω 2W load should be used at the circuit end of the cable for maximum pulse fidelity.

The 50Ω terminations should always be used on the SYNC and TTL outputs and 50Ω Thevenin loads should be used on the ECL outputs.

3.2.5 Nonlinear and Reactive Loads

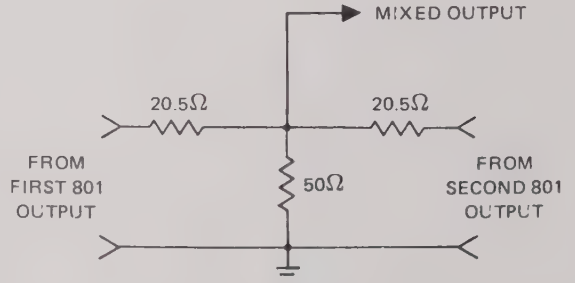
Both nonlinear and reactive loads will cause pulse distortion. Reactive loads driven with fast transitions cause voltage spikes that can damage the 801 output amplifier. If it is necessary to drive reactive loads directly, the instrument must be protected against these voltage spikes.

3.2.6 Duty Cycle

Always use the lowest range possible for both delay and width functions. This will reduce the recovery time of the one-shots and extend the maximum duty cycle of the 801 to its fullest capability.

3.2.7 Output Mixing

The outputs of two 801's may be mixed using the following network.



Maximum output from either generator is limited to 6 volts.

3.2.8 Precise Output Levels

Many times when testing a circuit it is desirable to lock the output of the generator at either the high or low level. A precise measurement of this level may then be obtained using a DVM.

The external width mode is useful for this purpose. Set the MODE to EXT WIDTH, TRIGGER to ⊔⊓ and TRIGGER LEVEL maximum cw. The output will now be locked to the lower level. Switching the trigger to ⊓⊔ will lock it to the upper level.

The OUTPUT NORM/COMP switch could also be used to reverse the upper and lower levels as the trigger edge does, but some error could be introduced by the X-Y multiplier.

3.2.9 Rise Time Measurements

When measuring rise time in a linear device under test, the error induced by the rise time of the testing system must be considered. For example, when observing the 801 rise time on an oscilloscope, 801 rise time is

$$t^2_{observed} = t^2_{scope} + t^2_{801}$$

or

$$t_{801} = \sqrt{t^2_{observed} - t^2_{scope}}$$

That is, the observed rise time must be corrected for by the inherent oscilloscope rise time to determine the actual 801 rise time. Extending the method to include a circuit under test will determine circuit under test rise time:

$$t^2_{observed} = t^2_{801} + t^2_{scope} + t^2_{c.u.t.}$$

3.3 OPERATION

In the following descriptions of operation, observe the pulse on an oscilloscope. When the 50Ω OUT pulse is not desired, disregard leading and trailing edge adjustments. (See figure 3-2 for pulse parameters.)

3.3.1 Continuous Pulses

Set the controls as follows for continuous pulse output.

Control	Operation
MODE	CONT
OUTPUT	NORM (or COMP if inverted pulse is desired)
All Other Controls	Set as desired. DELAY is constrained to be less than PERIOD − (WIDTH + TRAILING EDGE). If a large pulse WIDTH is desired but cannot be obtained, refer to paragraph 3.3.2.

3.3.2 Continuous Wide Duty Cycle Pulses

Follow this setup for pulses greater than those that can be obtained in paragraph 3.3.1. The "pulse" that appears to be positive going is referred to as the > 70% pulse.

Control	Operation
MODE	CONT
OUTPUT	COMP
PERIOD/RATE and Level Controls	Set as desired.
WIDTH	Set to desired lower level time (see figure 3-4). The > 70% pulse will start WIDTH time after SYNC leading edge with DELAY OFF.

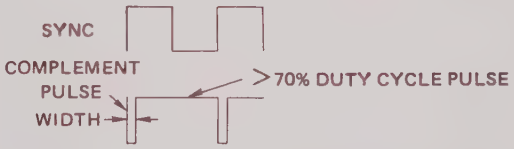


Figure 3-4. Greater Than 70% Duty Cycle Pulse

Control	Operation
Edge Controls and DELAY	Set as desired.

3.3.3 Triggered Pulses

Set up as in paragraph 3.3.1. If triggering with an external signal, connect the trigger source to TRIG INPUT. Ensure that the trigger rate is slower than the pulse rate.

Control	Operation
MODE	TRIG
TRIGGER	Set as desired. (Observe TRIG indicator to ensure triggering occurs.)

3.3.4 Gated Pulses

Set up as in paragraph 3.3.1. If gating with an external signal, connect the gate source to TRIG INPUT. Set the gate pulse width to allow the number of pulses desired. Reset the controls as follows.

Control	Operation
MODE	GATE
TRIGGER	Set as desired. (Observe TRIG indicator to ensure triggering occurs.)

3.3.5 Pulses With Width Controlled Externally

Connect the trigger source to TRIG INPUT and set the controls as follows.

Control	Operation
MODE	EXT WIDTH
TRIGGER	Set as desired. (Observe TRIG indicator to ensure triggering occurs.)
Edge Controls and Output Controls	Set as desired.

3.3.6 Triggered Burst of Pulses

In triggered burst mode, the trigger initiates a gate pulse, controlled by the DELAY control, which gates the output pulses. Set the controls as follows.

Control	Operation
MODE	TRIG BURST
TRIGGER	Set as desired. (Observe TRIG indicator to ensure triggering occurs.)
PERIOD, WIDTH, Edge Controls and Output Controls	Set as desired.
DELAY	Set to the total period time of the number of pulses desired in the burst.
TRIG INPUT	Set input trigger period to greater than the DELAY time.

NOTE

Trigger Period > Delay Time > Pulse Period

3.3.7 Continuous Double Pulses

For continuous double pulses, set the controls as follows.

Control	Operation
MODE	CONT DBL
OUTPUT	NORM (or COMP if inverted pulse is desired)
WIDTH	Set as desired.
DELAY	Set for desired width between double pulses.
PERIOD/RATE	Set for sum of WIDTH + DELAY + time desired between successive double pulses.
Edge Controls and Level Controls	Set as desired.

3.3.8 Triggered Double Pulses

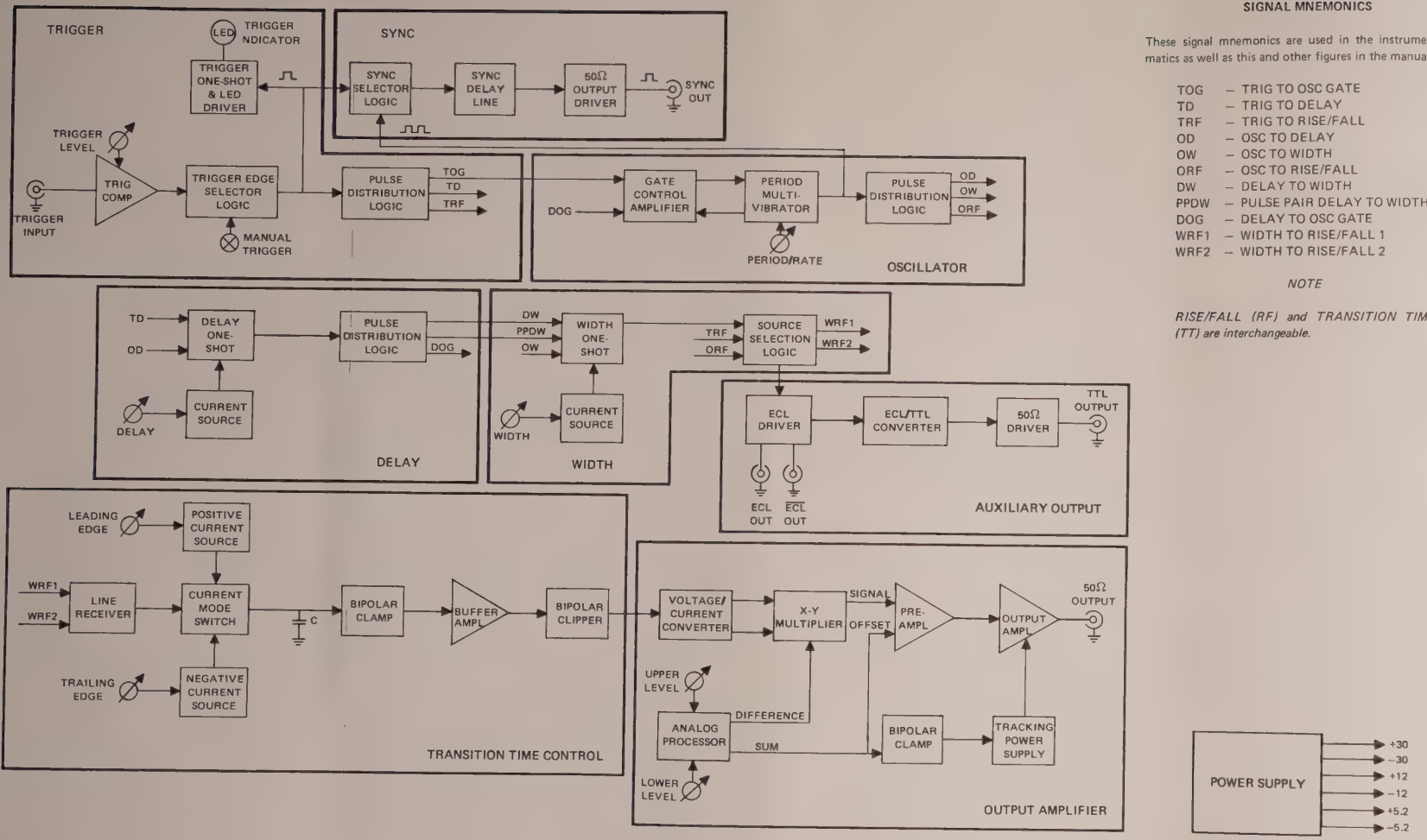
Set up as in paragraph 3.3.7. If triggering with an external signal, connect the trigger source to TRIG INPUT. Reset the controls as follows.

Control	Operation
MODE	TRIG DBL
Control	**Operation**
TRIGGER	Set as desired. (Observe TRIG indicator to ensure triggering occurs.)

3.3.9 Gated Double Pulses

Set up as in paragraph 3.3.7. If gated with an external signal, connect the gate source to TRIG INPUT. Set the gate pulse width to allow the number of pulses desired. Reset the controls as follows.

Control	Operation
MODE	GATE DBL
TRIGGER	Set as desired. (Observe TRIG indicator to ensure triggering occurs.)



SIGNAL MNEMONICS

These signal mnemonics are used in the instrument schematics as well as this and other figures in the manual.

TOG	– TRIG TO OSC GATE
TD	– TRIG TO DELAY
TRF	– TRIG TO RISE/FALL
OD	– OSC TO DELAY
OW	– OSC TO WIDTH
ORF	– OSC TO RISE/FALL
DW	– DELAY TO WIDTH
PPDW	– PULSE PAIR DELAY TO WIDTH
DOG	– DELAY TO OSC GATE
WRF1	– WIDTH TO RISE/FALL 1
WRF2	– WIDTH TO RISE/FALL 2

NOTE

RISE/FALL (RF) and TRANSITION TIME (TT) are interchangeable.

Figure 4-1. Overall Block Diagram

SECTION 4
CIRCUIT DESCRIPTION

4.1 OVERALL BLOCK DIAGRAM

The Model 801 is made up of nine major circuit blocks. They are: trigger circuit, sync circuit, period oscillator, delay one shot, width one shot, transition time control circuit, output amplifier, auxiliary outputs and a power supply (see figure 4-1).

The main circuit board contains the transition time control circuit, output amplifier and power supply. Most circuitry is in the form of discrete components.

The timing board contains all the remaining circuit blocks. They are made of a combination of high speed emitter coupled logic (ECL) and discrete components.

The ECL logic serves a dual purpose. In addition to making up the individual circuits, it couples signals from one block to another. The coupling path depends on the generator mode selected. The mode control switch programs the pulse distribution logic to give the proper path.

4.2 TRIGGER CIRCUIT

The trigger input signal level is compared against a threshold voltage from the trigger level potentiometer (−4V to +4V) by the trigger comparator (figure 4-1). When the level set by the trigger level potentiometer is exceeded, the output of the comparator changes logic states. It will change back to its original state as the threshold voltage is passed a second time in the opposite direction. Hysteresis between the two levels is approximately 100 mV.

The output of the comparator is sent to a logic circuit which selects the leading or trailing edge as the trigger source. The signal at this point is monitored for transitions by an ac coupled 100 ms one shot which drives the LED trigger indicator. Every transition causes the LED to flash on for 100 ms. The manual trigger switch will also cause the trigger indicator to flash. The trigger pulse is then routed by the pulse distribution logic to the other circuit blocks.

4.3 PERIOD OSCILLATOR

The period oscillator is a basic ECL gate multivibrator. A simplified diagram is shown in figure 4-2.

The RC time constant determines the charge and discharge rates for capacitor C and, therefore, the frequency of operation.

Positive feedback via the path through C results in a stable oscillator. Varying resistor R changes the frequency over a 10:1 range. Note that since the charging and discharging currents are equal but opposite, the resulting waveform has a 50% duty cycle.

The oscillator may be gated on and off by the gate amplifier and diode CR. When the output of the gate amplifier is low, diode CR will be reversed biased allowing the oscillator to run. When the output is high, CR pulls the input node A of the gate high, which holds node C low and no oscillation can occur. The output of the oscillator is buffered and routed to other circuitry by the pulse distribution logic.

4.4 SYNC CIRCUIT

The sync selector logic circuit (figure 4-1) selects either the output of the trigger circuit or the oscillator square wave as the sync output. This signal is delayed to compensate for the delay through the output amplifier and then fed to a 50 ohm output driver stage.

4.5 DELAY CIRCUIT

The delay circuit (figure 4-1) consists of an ECL gate and discrete circuit one shot multivibrator. When the delay circuit is triggered, a timing capacitor is discharged by a constant current source until a threshold point is reached. The circuit then resets by rapidly recharging the timing capacitor. The output pulse from the ECL gate has a width proportional to the timing capacitor value and the magnitude of the current source. The pulse distribution logic routes the delay pulse to the other circuitry.

4.6 WIDTH CIRCUIT

The operation of the width one shot and the delay one shot is identical. The width circuit (figure 4-1) accepts triggering information from different sources, however. The width one shot output is connected to the source selection logic circuit. This circuit selects the signal that drives the output amplifier. The oscillator square wave, the trigger circuit output, or the width one shot output may be selected.

The source selection logic drives the auxiliary outputs and also drives the variable transition control circuit located on the main board.

4.7 AUXILIARY OUTPUTS

The auxiliary outputs (figure 4-1) carry the same signal as the 50 ohm output, but the levels and transition times are fixed. The ECL driver feeds signals to the ECL and $\overline{\text{ECL}}$ outputs and also to an ECL-to-TTL converter. The converter feeds a 50 ohm output driver circuit which provides a TTL level signal into 50 ohms.

4.8 TRANSITION TIME CONTROL CIRCUIT

The transition time control circuit (see figure 4-1) accepts the differential signal from the width one shot in an ECL line receiver and then drives a current mode switch.

The current mode switch connects either the positive or negative current source to capacitor C. The constant current sources form positive and negative going linear ramps which are clamped to a constant level by a bipolar clamp circuit. The current sources are controlled by front panel potentiometers. Changing the current will change the transition time.

The bipolar clamp drives a buffer amplifier for impedance matching which then drives a bipolar clipping circuit. The clipping circuit removes any voltage variations introduced by the clamp circuit and establishes precise amplitude levels.

4.9 OUTPUT AMPLIFIER

The output amplifier accepts the signal from the transition time control circuit, establishes upper and lower pulse levels and delivers it to the 50 ohm load.

An X-Y multiplier is used to give independent upper and lower level controls. The multiplier requires a voltage-to-current converter in the signal path since it works on a differential current splitting technique. The X-Y multiplier controls the magnitude of these currents to establish an output amplitude. The difference between the upper and lower level controls programs the multiplier to produce the required peak-to-peak output signal. The signal is further processed in the preamp circuit. The multiplier output signal is always symmetrical about ground, so a signal proportional to the sum of the upper and lower level controls is added to give the correct dc offset. The preamp output signal upper and lower levels are proportional to the setting of the front panel controls.

The preamp output is further amplified by the output amplifier. The power amplifier power supplies track the midpoint level programmed by the upper and lower level controls. A bipolar clamp limits the supplies when equal upper and lower levels are selected near the output extreme, such as +9.5V and +10.0V.

4.10 MODES OF OPERATION

The major circuit block connections depend on the mode of operation selected. Block diagrams of the major modes and key waveforms are shown in figures 4-3 thru 4-9.

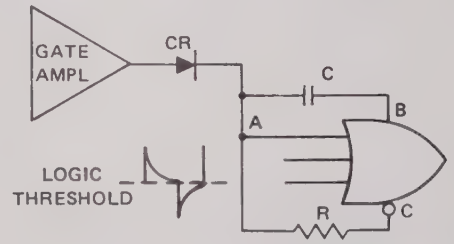


Figure 4-2. Simplified ECL Gate Multivibrator

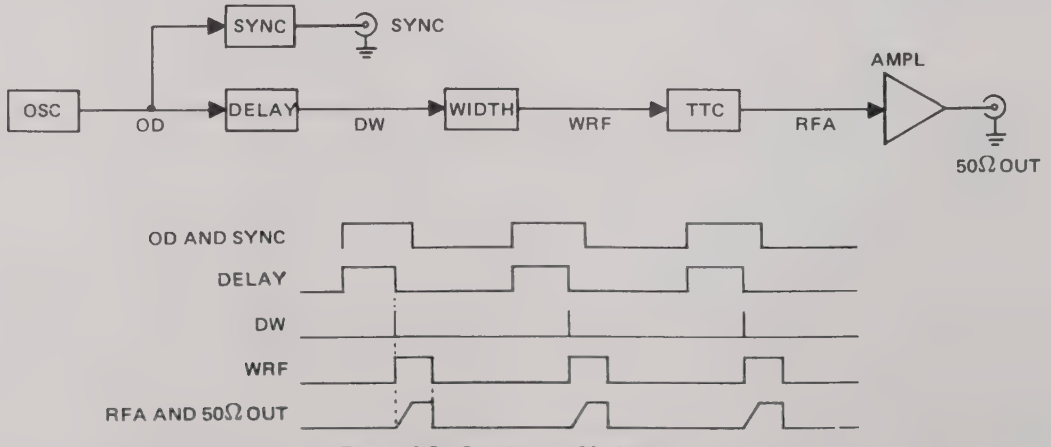


Figure 4-3. Continuous Mode

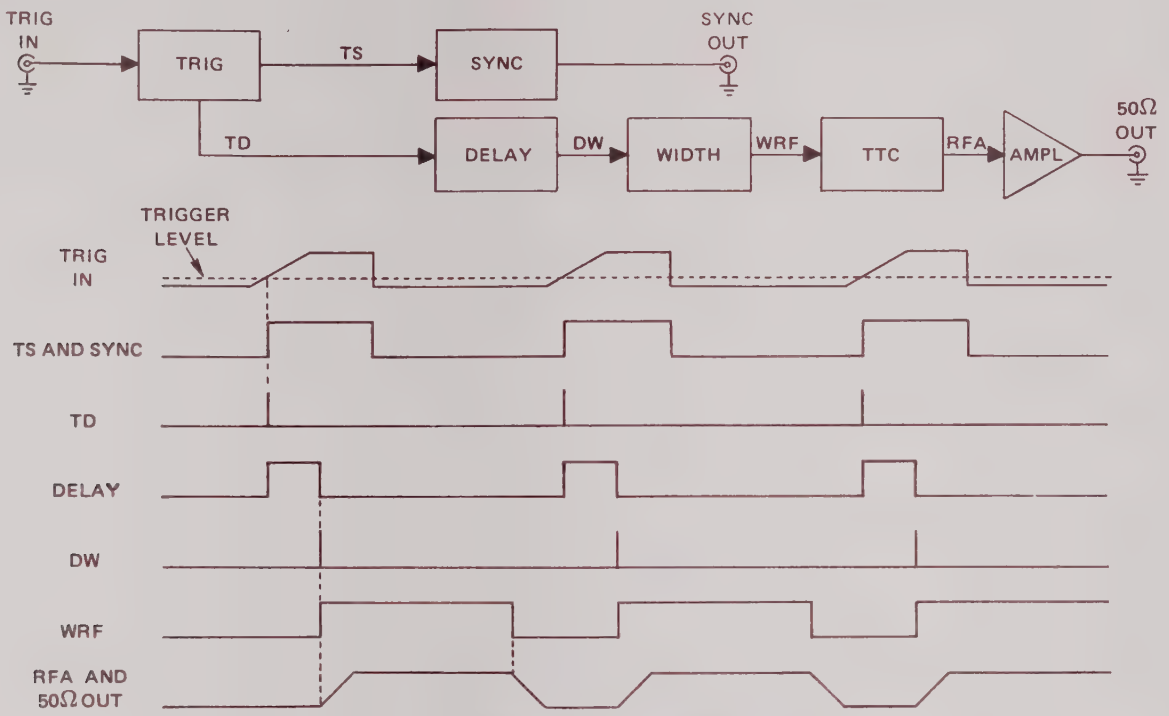


Figure 4-4. Trigger Mode

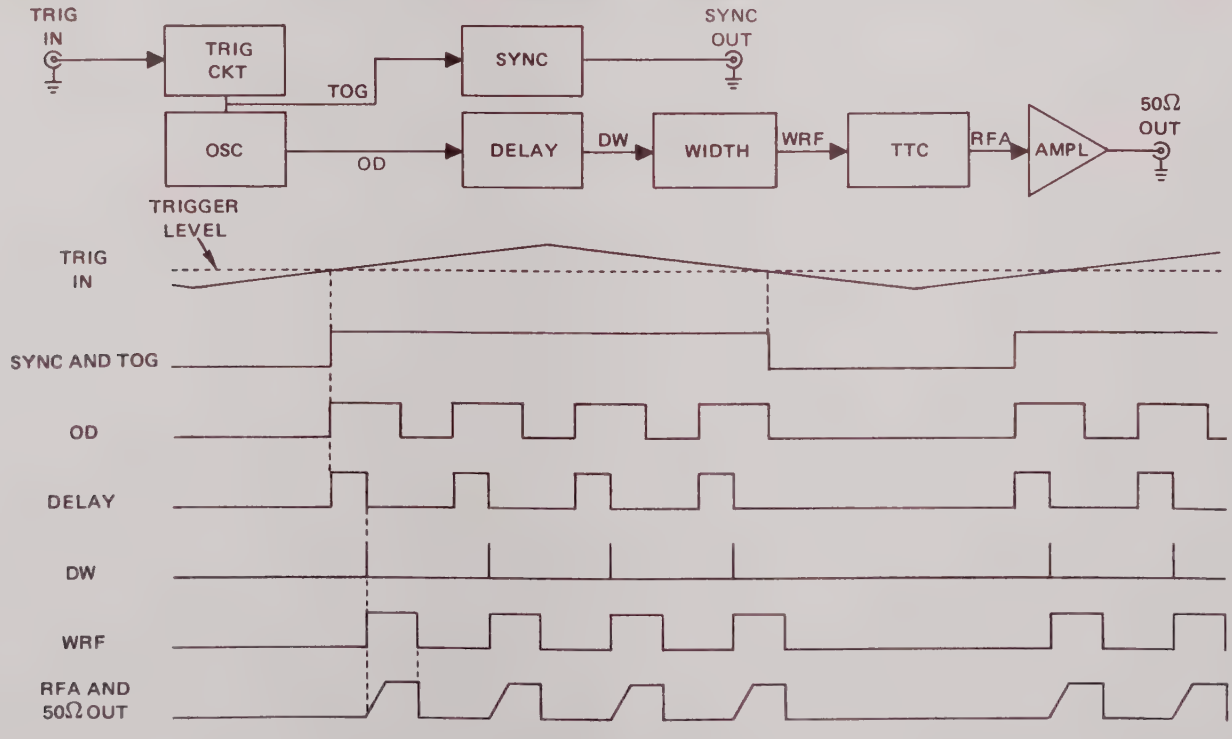


Figure 4-5. Gate Mode

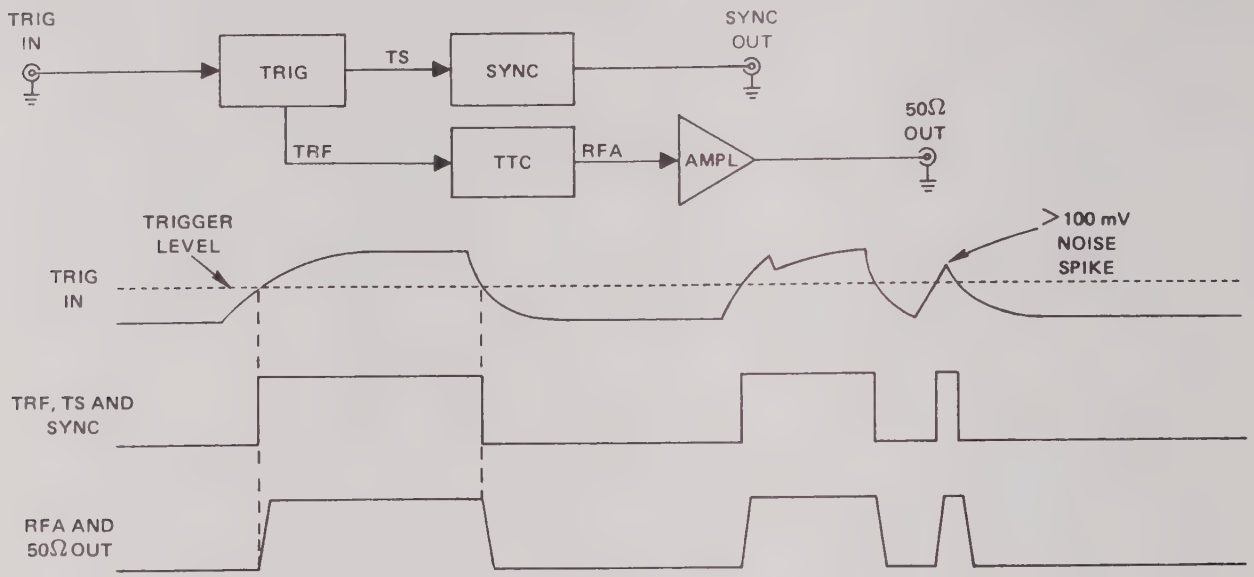


Figure 4-6. External Width

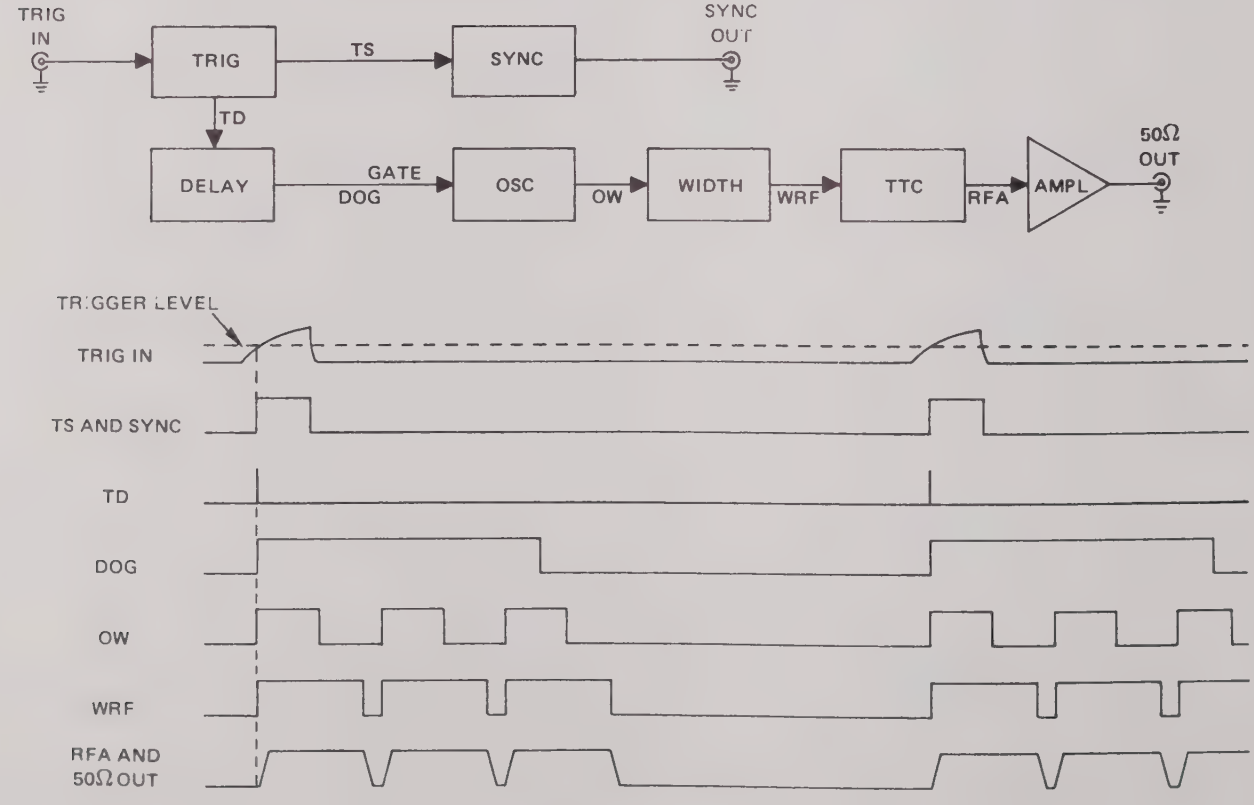


Figure 4-7. Trigger Burst

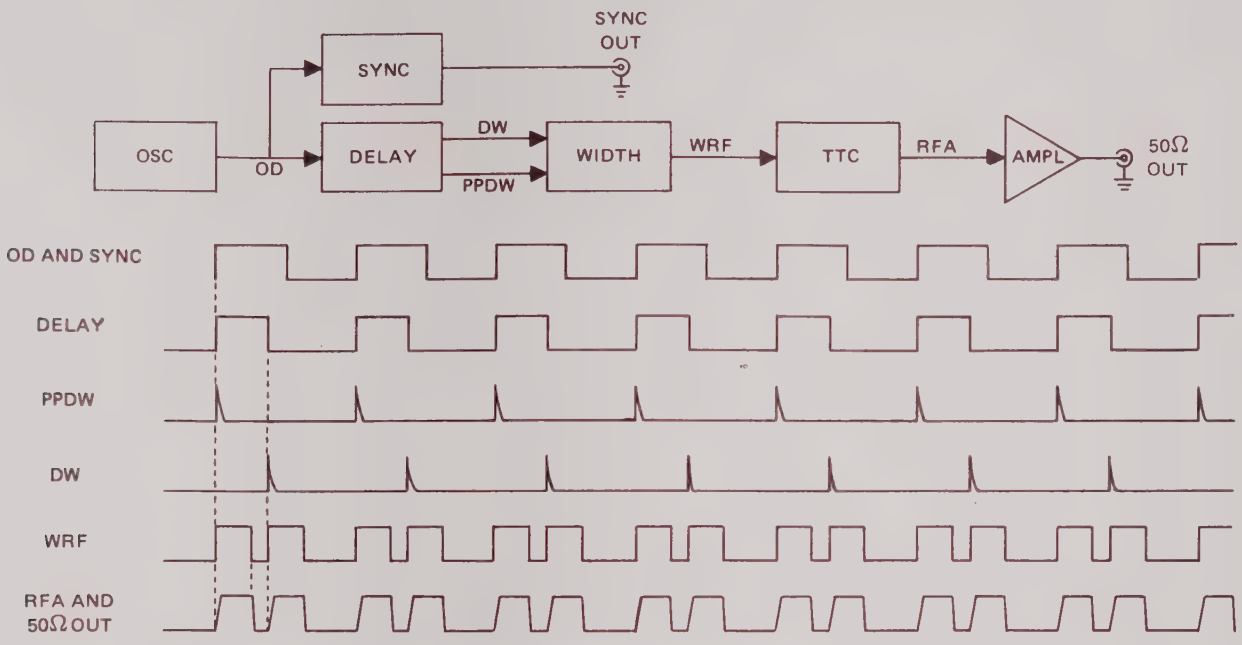


Figure 4-8. Continuous Double Pulse Mode

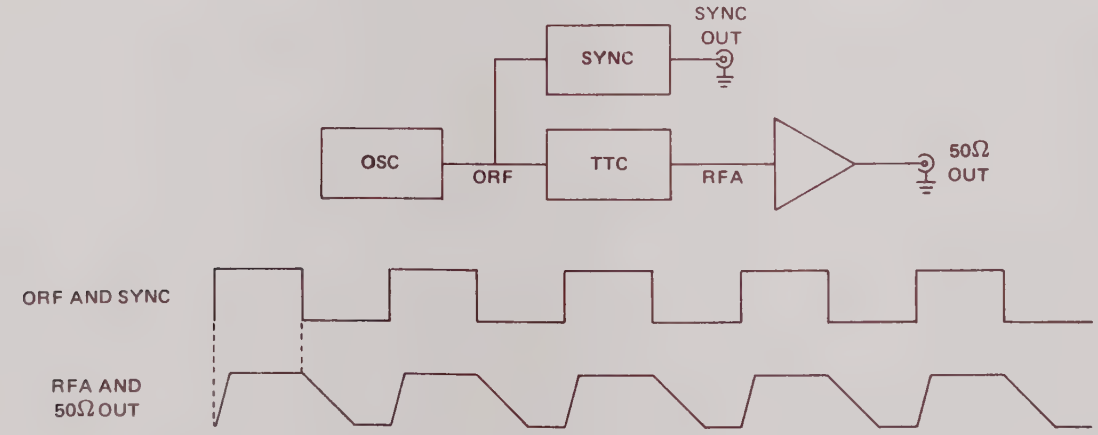


Figure 4-9. Continuous Square Wave Mode

SECTION 5
CALIBRATION

5.1 FACTORY REPAIR

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

5.2 REQUIRED TEST EQUIPMENT

Voltmeter . . . . . Millivolt dc measurement (0.1% accuracy)
Oscilloscope, Dual Channel . . . . . 500 MHz bandwidth
Counter . . . . . 55.0 MHz (0.01% accuracy)
50Ω Load . . . . . ±0.1% accuracy, 2W
Function Generator . . . . . 5 kHz ∿ , 4V p-p

5.3 REMOVING GENERATOR COVERS

1. Invert the instrument and remove the four screws in the cover.
2. Turn the instrument upright, remove the top cover, and remove the four screws securing the bottom cover.
3. Replace the top cover and turn the instrument upside down.

NOTE

Remove the cover only when it is necessary to make adjustments or measurements.

5.4 CALIBRATION

After referring to the following preliminary data, perform calibration, as necessary, per table 5-1. If performing partial calibration, check previous settings and adjustments for applicability. See figures 5-1 and 5-2 for calibration point location.

The completion of these calibration procedures returns the instrument to correct calibration. All limits and tolerances given in these procedures are calibration guides and should not be interpreted as instrument specifications. Instrument specifications are given in section 1 of this manual.

1. Unless otherwise noted, all measurements made at the 50Ω OUT connector should be terminated into a 50Ω (±0.1%) load.
2. Start the calibration by connecting the unit to an ac source and setting the front panel switches as follows:

MODE . . . . . CONT
TRIGGER . . . . . MAN TRIG
PERIOD . . . . . 20 μs I 200 μs
PERIOD VARIABLE . . . . . Full cw
DELAY . . . . . OFF
WIDTH . . . . . ⊓
TRANSITION TIME . . . . . 5 ns I 50 ns
LEADING EDGE . . . . . × 1
TRAILING EDGE . . . . . × 1
OUTPUT . . . . . NORM
LOWER LEVEL . . . . . −10V
UPPER LEVEL . . . . . +10V

3. Allow the unit to warm up at least 30 minutes for final calibration. Keep the instrument covers on to maintain heat. Remove covers only to make adjustments or measurements.

Table 5-1. Calibration Chart

Step	Check	Tester	Cal Points	Control Settings	Adjust	Desired Results	Remarks
1	Power Supply	Voltmeter	TP1 (J4 Gnd)		R2	+5.2V ±20 mV	
2			TP2		R3	−5.2V ±20 mV	
3			TP3			+12V ±500 mV	If out of tolerance and steps 1 and 2 are OK, troubleshoot power supply
4			TP4			−12V ±500 mV	If out of tolerance and steps 1, 2 and 3 OK, troubleshoot power supply
5	Output/ Level Adjust-ments	Scope	TP5		R45	Equal + and − peaks	
6			50Ω OUT	LOWER LEVEL: −10V	R118	Minimum lower level shift	Use 50Ω load at scope. Observe lower level while varying upper level from 0 to −10V.
7				UPPER LEVEL: +10V		Minimum upper level shift	Observe upper level while varying lower level from 0 to +10V.
8						Optimum potentio-meter position	Repeat steps 6 and 7, as necessary.
9				UPPER LEVEL: +250 mV on scope LOWER LEVEL: −250 mV on scope	R79	Minimum p-p ampli-tude change	AC couple scope. Adjust R79 while switching OUTPUT from NORM to COMP.
10					R63	Minimum dc level shift	DC couple scope. Adjust R63 while switching OUTPUT from NORM to COMP.
11		Voltmeter	TP6		R103	0 ±20 mV	Connect P3 to J4.
12	Tracking Power Supply		+18V Supply Jumper		R195	+16.1 ±0.1V	
13			−18V Supply Jumper		R196	−16.1 ±0.1V	

Table 5-1. Calibration Chart (Continued)

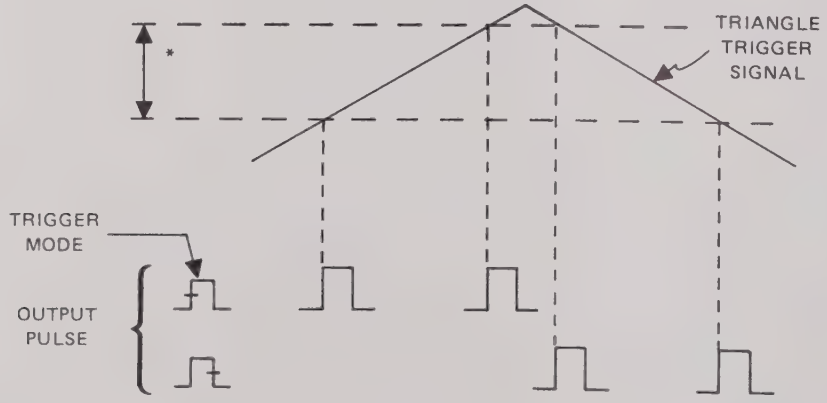
Step	Check	Tester	Cal Points	Control Settings	Adjust	Desired Results	Remarks
14	Output Amplitude Zero Adjustment	Voltmeter	50Ω OUT		R150	0 ±20 mV	Load output with 50Ω. Connect P3 to J3 after adjusting R150.
15	Level Knobs	Scope		LOWER LEVEL: 0V on scope UPPER LEVEL: +5V on scope	LOWER LEVEL knob	LOWER LEVEL knob indicates 0V on panel when 0V on scope	Loosen LOWER LEVEL knob and reposition if necessary. When set correctly, remove UPPER LEVEL knob.
16				LOWER LEVEL: 0V on scope UPPER LEVEL: 0V on scope	UPPER LEVEL knob	Mechanically linked to LOWER LEVEL knob when scope shows 0V	After setting shaft for 0V on scope, replace UPPER LEVEL knob without tightening. Turn knob ccw until mechanical stop starts to pull LOWER LEVEL knob. Tighten setscrew.
17				LOWER LEVEL: 0V UPPER LEVEL: cw until touching LOWER LEVEL knob PERIOD: 10 ms on scope	R116	UPPER LEVEL indicates +10V	
18				LOWER LEVEL: −10V UPPER LEVEL: 0V		Pulse is 0 to −10V on scope	If incorrect, repeat steps 15, 16 and 17.
19	Output Amplitude Response			LOWER LEVEL: −5V on scope UPPER LEVEL: +5V on scope PERIOD: 5 MHz on scope	C48, C72	Best waveform quality with overshoot ⩽ ±5%, rise time ⩽ 7 ns, fall time ⩽ 7 ns	

NOTE: Replace bottom cover and turn the instrument right side up.

20	Symmetry	Scope	50Ω OUT	PERIOD: 20 µs ▮ 200 µs PERIOD VARIABLE: full cw	R66	1% symmetry	

Table 5-1. Calibration Chart (Continued)

Step	Check	Tester	Cal Points	Control Settings	Adjust	Desired Results	Remarks
21	TRIG Indicator	Scope	50Ω OUT		R33	TRIG lamp just goes out	
	NOTE: Apply a 5 kHz, 4V p-p triangle wave trigger.						
22	TRIG Indicator	Scope	50Ω OUT	MODE: TRIG TRIGGER: ⊓⊔ WIDTH: 1 μs ❙ 10 μs WIDTH VARIABLE: 12 o'clock	R33	TRIG lamp indicates triggering throughout trigger level range	Trigger scope on SYNC pulse. Observe trigger signal and output pulse as trigger level is varied per figure 5-3.
23				TRIGGER: ⊓⊔			
24	First Period Adjustment			MODE: GATE PERIOD: 2 μs ❙ 20 μs PERIOD VARIABLE: full cw WIDTH: ⊔⊓	R54	First cycle = second cycle period No delay of first cycle leading edge from sync	Adjust TRIGGER LEVEL for 3 pulse cycles on the scope. Observe SYNC output on second channel.
25	Frequency	Counter		LOWER LEVEL: −10V UPPER LEVEL: +10V MODE: CONT PERIOD: 20 ns ❙ 200 ns PERIOD VARIABLE: full ccw	C21	50 (+1, −0) MHz	



*Vary TRIGGER LEVEL control from 5% thru 95% of trigger signal amplitude. Observe that the TRIG indicator lights for each pulse triggered.

Figure 5-3. Trigger In and Pulse Out

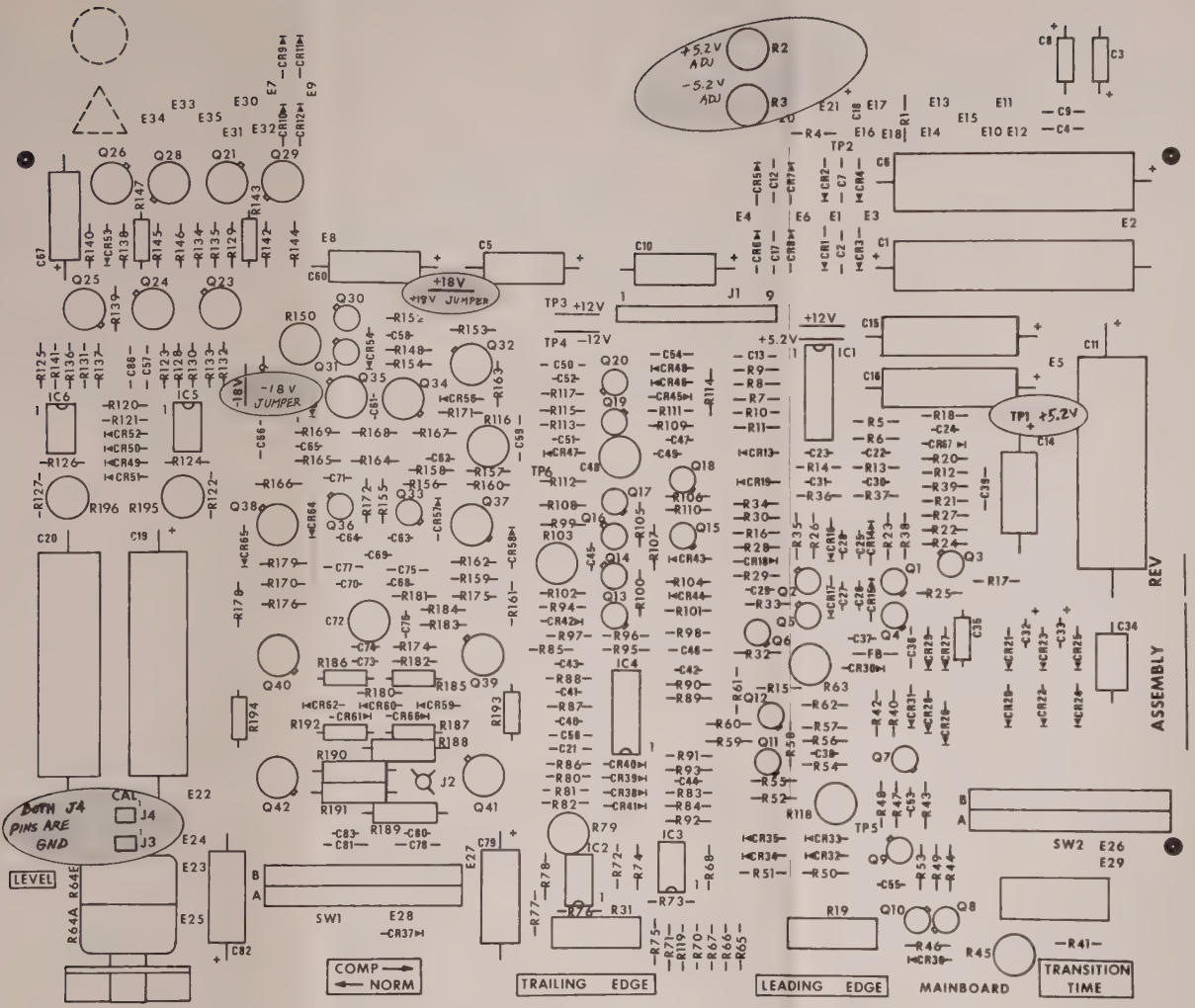


Figure 5-1. Main Board Calibration Points

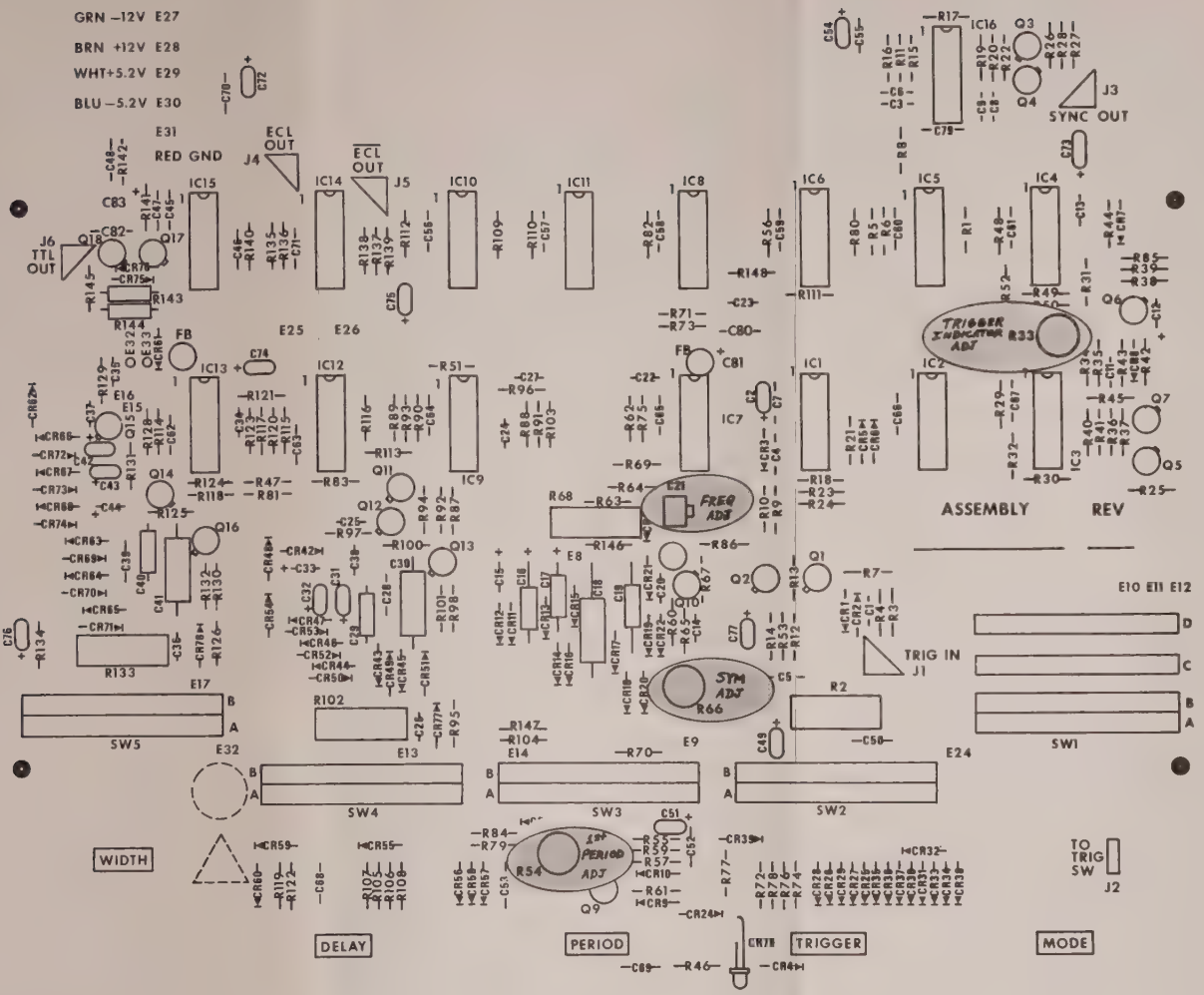


Figure 5-2. Timing Board Calibration Points

SECTION 6
TROUBLESHOOTING

6.1 INTRODUCTION

This section is organized as follows:

Safety
Circuit Board Access
Basic Techniques
Troubleshooting Individual Components
Flow Charts

Refer to paragraph 5.2 for required test equipment.

NOTE

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

6.2 SAFETY

6.2.1 Precautions

Refer all servicing and calibration to a qualified electronic technician.

Always disconnect the power cord when working on this instrument, unless electrical measurements are being taken. Never attempt to isolate the safety ground lug of the power cord.

Be sure that the fuse rating is correct and that the line voltage selector card is set to the proper range (refer to section 2).

Line voltage is present on the circuit board of the ac power connector, *even when the power switch is off.* This voltage is only accessible if the shield is removed from the ac power connector.

6.2.2 Safety Check

Disconnect the power cord from facility power and check that the resistance from the cord earth ground terminal to the instrument front panel metal is less than one ohm. Press the power switch on and measure the resistance between the instrument front panel metal and each of the power cord's two matching terminals. Resistance to each terminal should be greater than 2 megohms. Check the fuse for proper type and value. Remove the instrument covers and inspect the power supply and circuit boards for evidence of overheating or arcing. Check lines and cables for good physical connections. Correct any discrepancies detected.

6.3 CIRCUIT BOARD ACCESS

Remove the bottom cover (paragraph 5.3) for access to the transition board. Remove the four screws securing the two boards and the transition board for access to the timing board.

6.4 BASIC TECHNIQUES

Troubleshooting requires no special technique. Listed below are a few reminders of basic electronic fault isolation.

1. Check control settings carefully. Many times a seemingly malfunction is an incorrect control setting, or a knob that has loosened on its shaft.

2. Check associated equipment connections. Make sure that all connections are securely connected to the correct connector.

3. Perform the calibration procedure. Many out-of-specification indications can be corrected by performing specific calibration procedures.

4. Visually check the interior of the instrument. Look for such indications as broken wires, charred components and loose leads.

5. Try to isolate the problem to a specific circuit by checking generator operation in all modes and referring to the block diagrams for each mode (see figures 4-3 thru 4-9). After the problem has been isolated to a specific stage, check the dc operating voltages at the pins of all solid state devices within that stage.

6. Check the associated passive elements with a high impedance ohmmeter (instrument unplugged) before replacing a suspected semiconductor device.

6.5 TROUBLESHOOTING INDIVIDUAL COMPONENTS

6.5.1 Transistor

A transistor is defective if more than one volt is measured across its base emitter junction in the forward direction.

A transistor when used as a switch may have a few volts reverse bias voltage base to emitter.

If the collector and emitter voltages are the same, but the base emitter voltage is less than 500 mV forward voltage (or reversed bias), the transistor is defective.

A transistor is defective if its base current is larger than 10% of its emitter current (calculate currents from voltage across the base and emitter series resistors).

6.5.2 Diode

A diode is defective if there is greater than 1 volt (typically 0.7 volts) forward voltage across it (except Zener and LED).

6.5.3 Operational Amplifier

The "+" and "—" inputs of an operational amplifier will have less than 15 mV voltage difference when operating under normal conditions.

If the output voltage stays at maximum positive, "+" input voltage should be more positive than "—" input voltage, or vice versa; otherwise, the operational amplifier is defective.

6.5.4 FET Transistor

No gate current should be drawn by the gate of an FET transistor. If so, the transistor is defective.

The gate-to-source voltage is always reverse biased under a normal operating condition; e.g., the source voltage is more positive than the gate voltage for 2N5485, and the source voltage is more negative than gate voltage for a 2N5462. Otherwise, the FET is defective.

6.5.5 MOSFET Transistor

For MOSFET's such as the SD214 or SD215, a positive gate source voltage causes the device to conduct drain current. Zero volts or a negative voltage cause the device to pinch off. A MOSFET transistor can be damaged by a static charge buildup when out of the circuit. Keep MOSFET leads shorted together until soldered in the circuit board.

6.5.6 Capacitor

Shorted capacitors have zero volts across their terminals.

An opened capacitor can be located (but not always) by using a good capacitor connected in parallel with the capacitor under test and observing the resulting effect.

6.5.7 ECL Gate

The emitter coupled logic using NOR logic is:

INPUTS		OUTPUT
A	B	$C = \overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

The levels are:

"0" = +3.4V ±0.1V
"1" = +4.3V ±0.1V

Never short the output of an ECL gate to ground; this will damage the output transistor in the gate. Any input may be pulled high, even when driven by an output of another gate, by connecting a diode between the input and the +5.2V supply (anode to supply).

6.6 FLOW CHARTS

The flow charts (see figures 6-1 thru 6-9) help isolate any malfunction to a specific stage. If you already know the specific circuit block at fault, go directly to that block in the flow chart. If a problem cannot be isolated to a portion of a flow chart, then follow the flow chart from the beginning.

It is possible that all circuit blocks function, but the overall generator malfunctions. In this case, the mode control logic should be suspect and can be checked with the aid of the mode control truth tables (refer to tables 6-1 thru 6-8).

If the problem cannot be located, return the instrument to the factory for servicing, with a description of the failure.

Before performing flow chart troubleshooting, set the front panel controls as follows:

MODE	CONT
TRIGGER	⎍
TRIGGER LEVEL	12 o'clock
PERIOD	200 ns ▮ 2 μs
PERIOD VARIABLE	12 o'clock
DELAY	10 ns ▮ 100 ns
DELAY VARIABLE	12 o'clock
WIDTH	⎍
WIDTH VARIABLE	12 o'clock
TRANSITION TIME	5 ns ▮ 50 ns
LEADING EDGE	X 1
TRAILING EDGE	X 1
OUTPUT	NORM
LOWER LEVEL	−10V
UPPER LEVEL	+10V

Place a 50Ω load on the 50Ω OUT. Place a 50Ω load on the SYNC output.

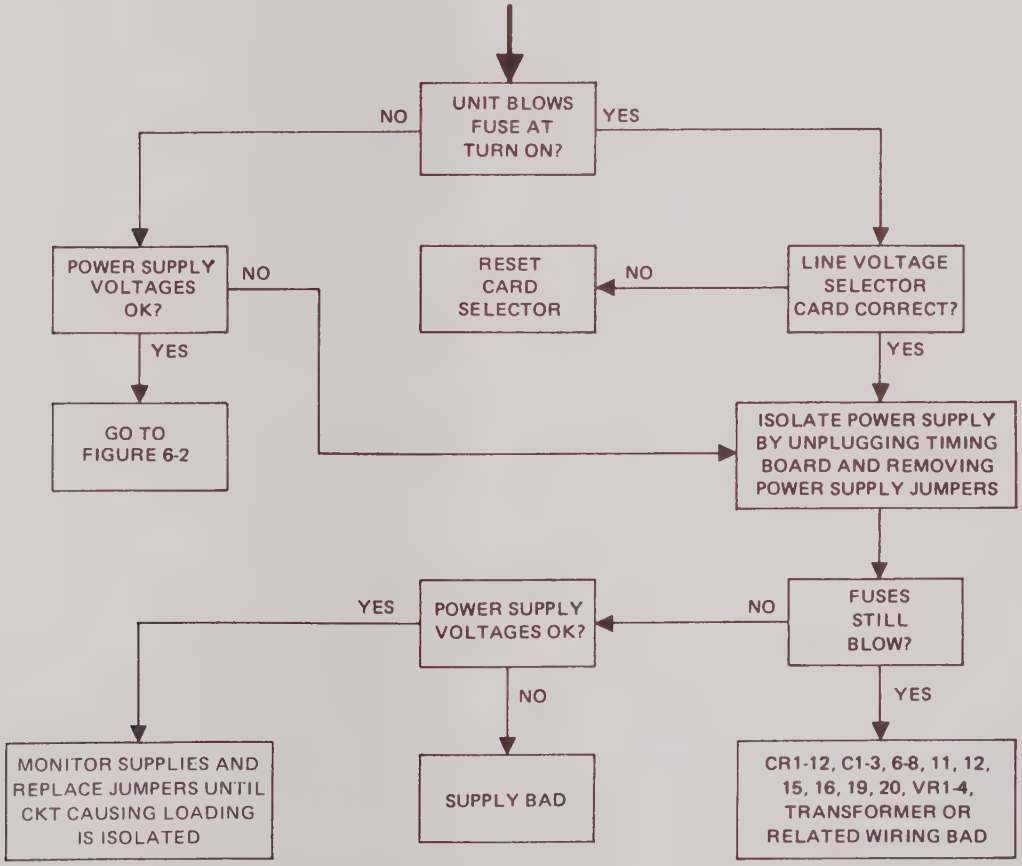


Figure 6-1. Power Supply Troubleshooting

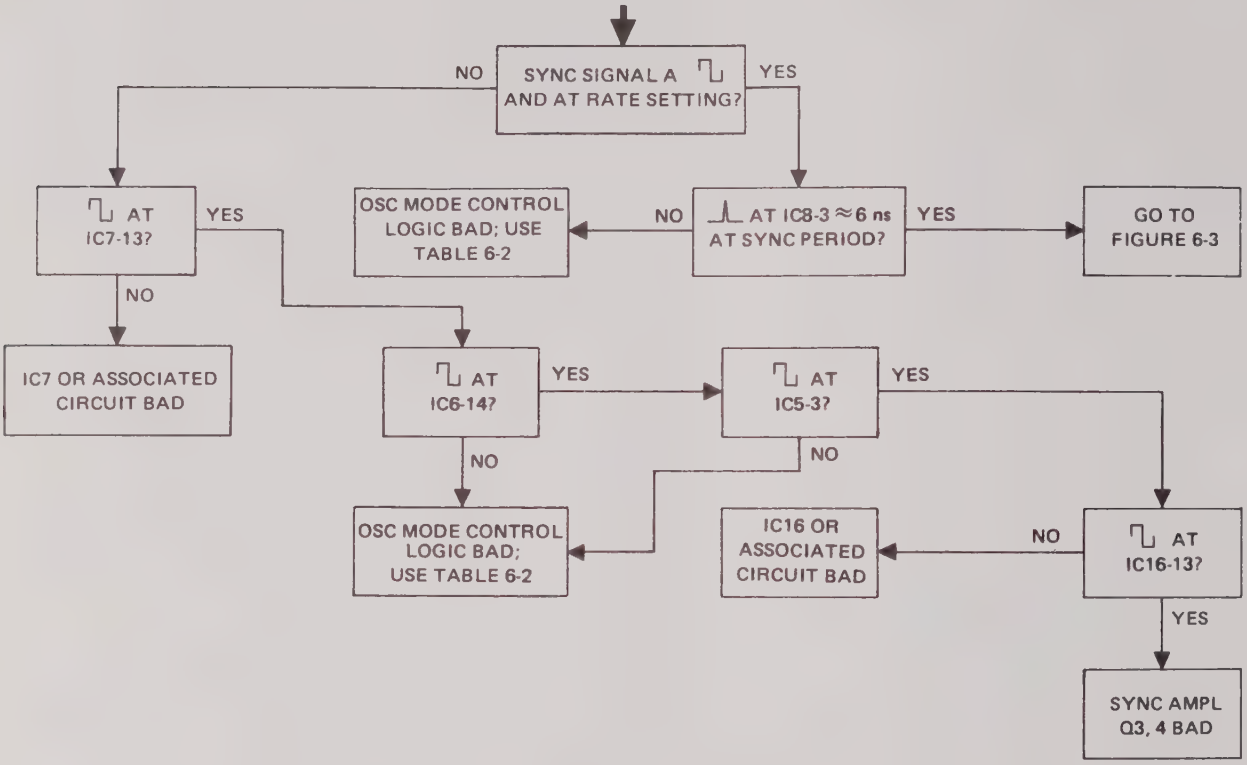


Figure 6-2. Oscillator Troubleshooting

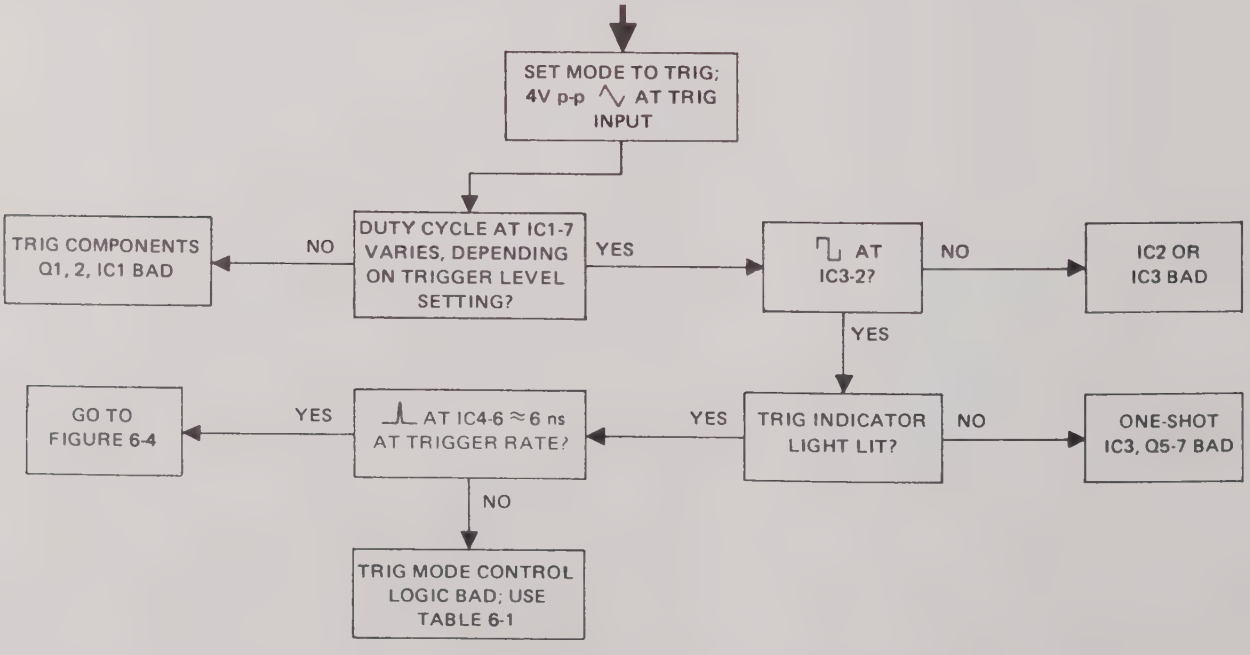


Figure 6-3. Trigger Troubleshooting

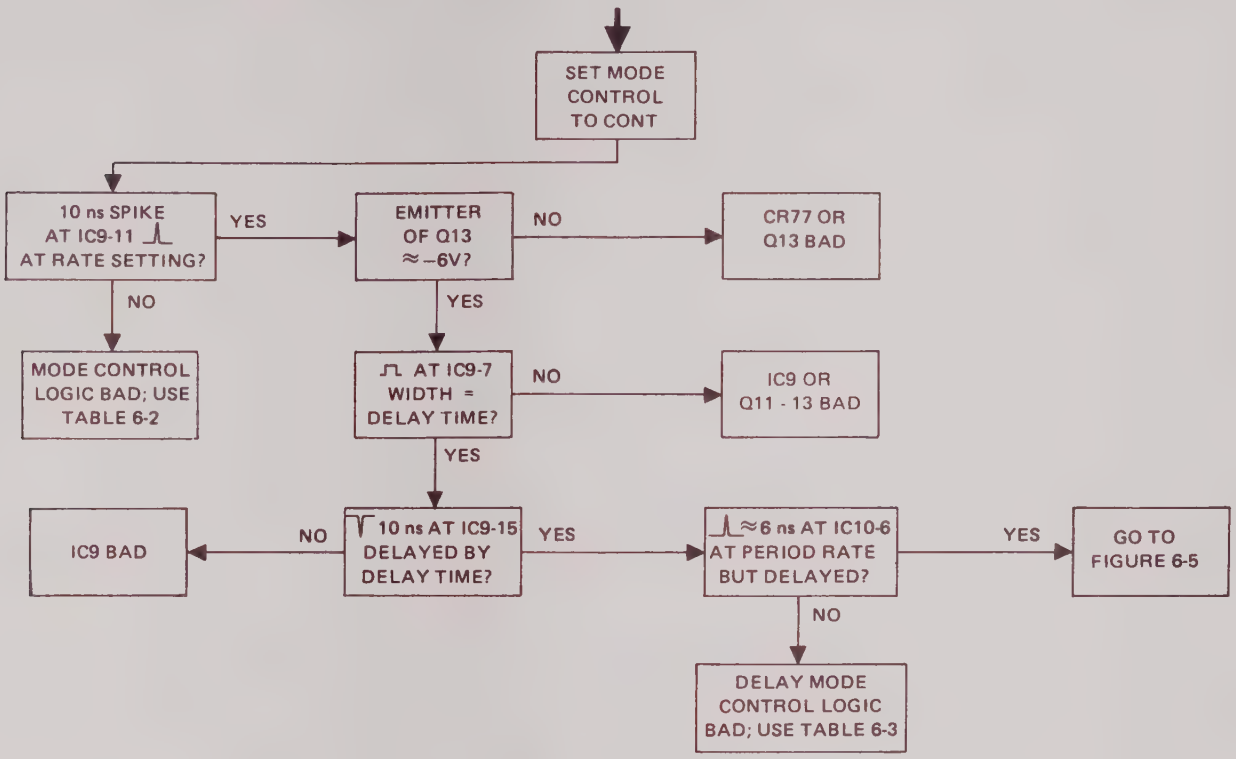


Figure 6-4. Delay Troubleshooting

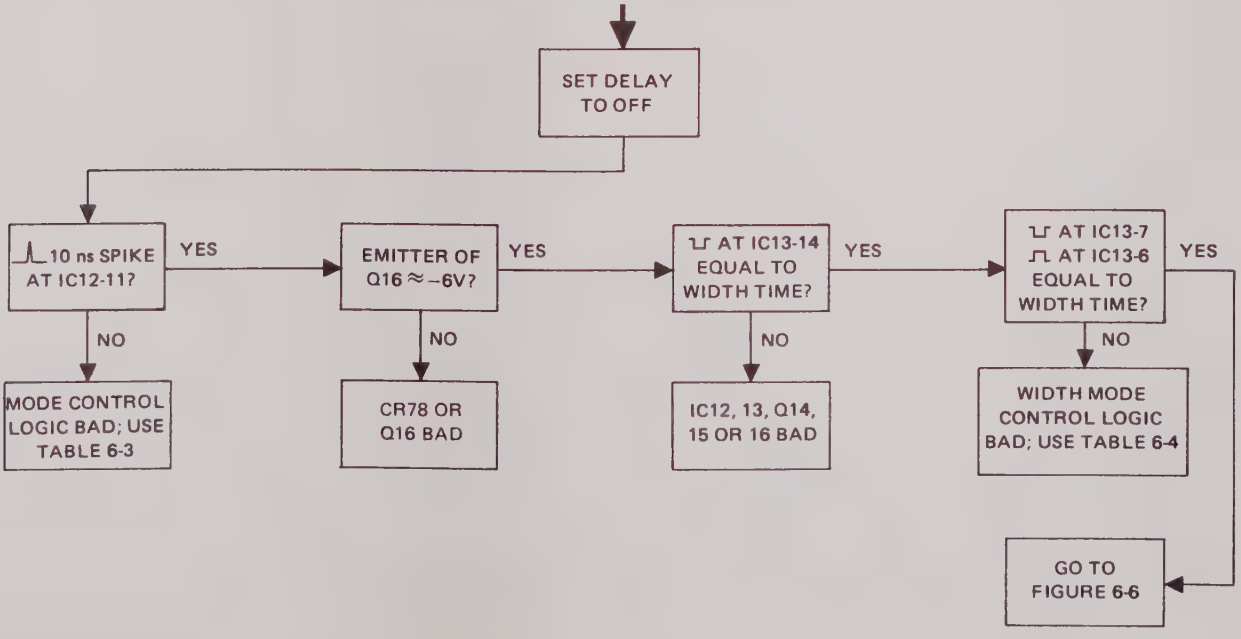


Figure 6-5. Width Troubleshooting

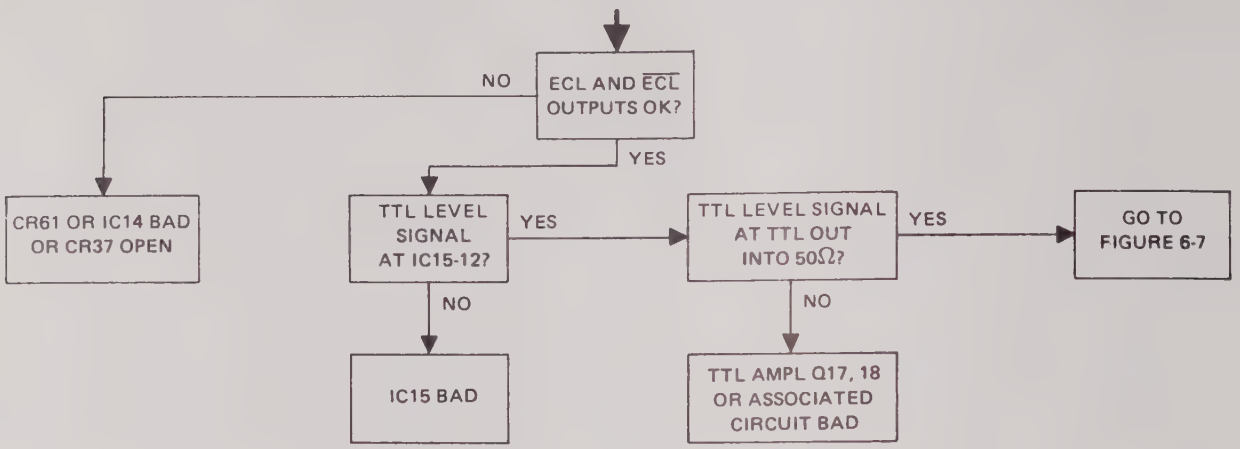


Figure 6-6. Fixed Output Troubleshooting

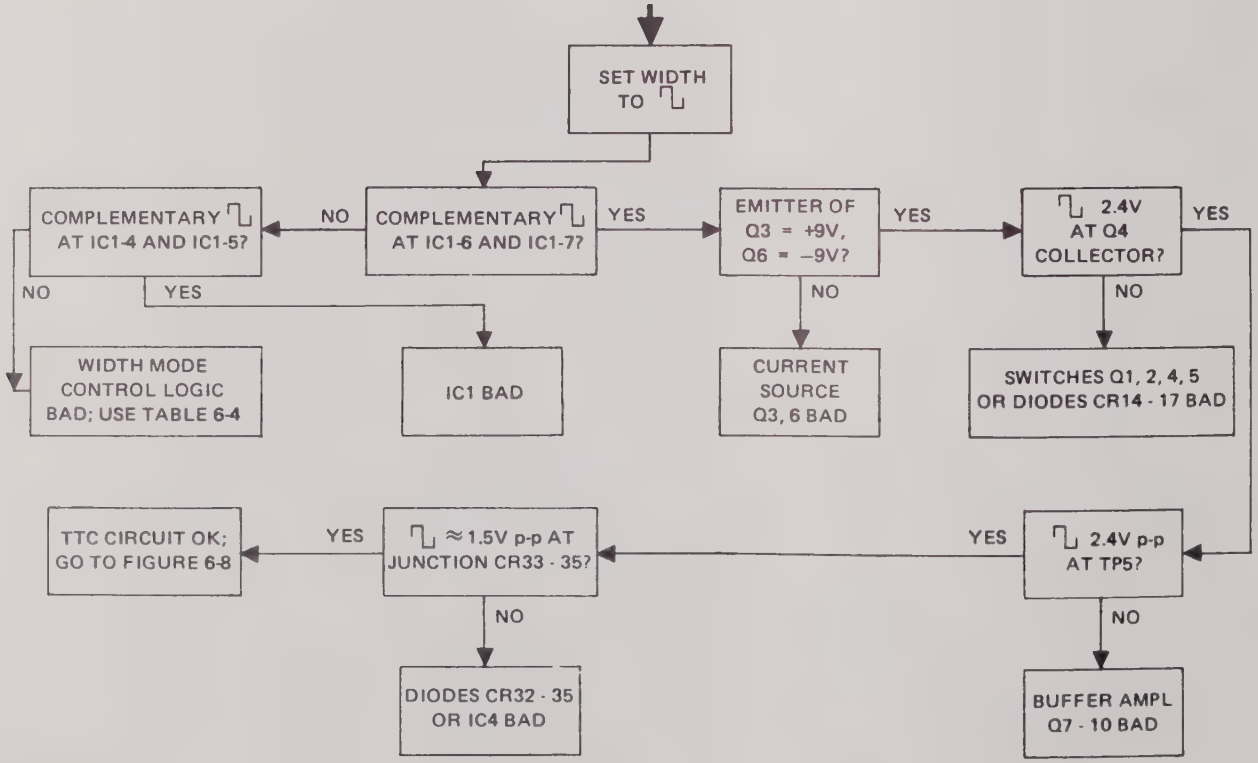


Figure 6-7. Transition Time Control Troubleshooting, Transition Board

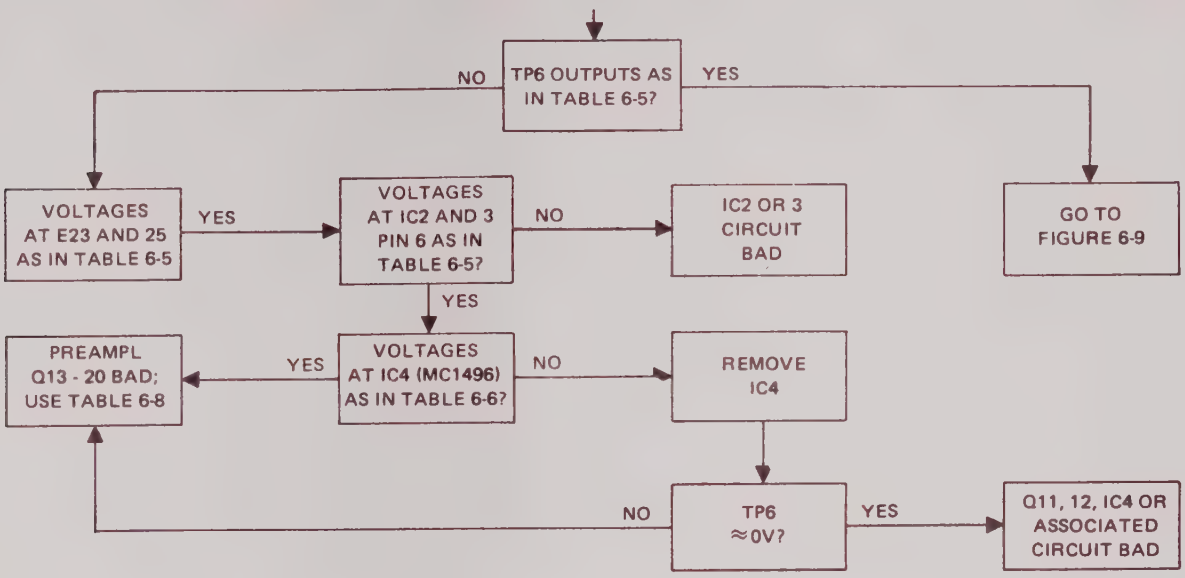


Figure 6-8. X-Y Multiplier and Preamp Troubleshooting

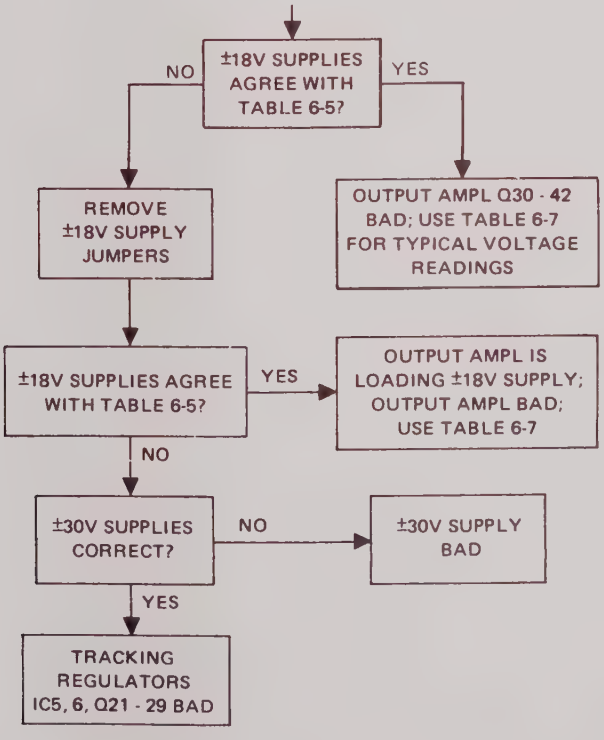

±18V SUPPLIES AGREE WITH TABLE 6-5?
NO
YES
REMOVE ±18V SUPPLY JUMPERS
OUTPUT AMPL Q30 - 42 BAD; USE TABLE 6-7 FOR TYPICAL VOLTAGE READINGS
±18V SUPPLIES AGREE WITH TABLE 6-5?
YES
OUTPUT AMPL IS LOADING ±18V SUPPLY; OUTPUT AMPL BAD; USE TABLE 6-7
NO
±30V SUPPLIES CORRECT?
NO
±30V SUPPLY BAD
YES
TRACKING REGULATORS IC5, 6, Q21 - 29 BAD

Figure 6-9. Output Amplifier Troubleshooting

Table 6-1. Trigger Mode Control Truth Table

SIGNAL	TDC	TD	TOGC	TOG	TRFC	TRF
IC-PIN	IC4-10	IC4-6	IC4-5	IC4-3	IC4-12	IC4-14
MODE						
CONT	1	0	1	0	1	0
TRIG	0	⅃	1	0	1	0
GATE	1	0	0	⊔	1	0
EXT WIDTH	1	0	1	0	0	⎍
TRIG BURST	0	⅃	1	0	1	0
CONT DBL	1	0	1	0	1	0
TRIG DBL	0	⅃	1	0	1	0
GATE DBL	1	0	0	⊔	1	0

⅃ Pulse width ≈ 6 ns
⎍ Pulse width depends on trigger signal

Table 6-2. Oscillator Mode Control Truth Table

SIGNAL	RFC	ORF	DLYC	OD	OWCL	OW	OSCL	OSYC	OIHB
IC-PIN	IC8-10	IC8-2	IC8-6	IC8-3	IC8-13	IC8-15	IC6-13	IC6-14	IC7-9
MODE									
CONT	0	0(⎍)	0	⅃(0)	1	0	0	⊔	0
TRIG	1	0	1	0	1	0	1	0	1
GATE	0	0(⎍)	0	⅃(0)	1	0	1	0	0
EXT WIDTH	1	0	1	0	1	0	1	0	1
TRIG BURST	0	0(⎍)	1	0	0	⅃(0)	1	0	0
CONT DBL	1	0	0	⅃	0	⅃	0	⊔	0
TRIG DBL	1	0	1	0	1	0	1	0	1
GATE DBL	1	0	0	⅃	0	⅃	1	0	0

Parenthetical entry indicates that WIDTH is set to ⊓
⎍ Pulse Width = ½ Period
⅃ Pulse Width ≈ 6 ns

Table 6-3. Delay Mode Control Truth Table

SIGNAL	DWCL	DW	DOCL	DOG	PDWC	PPDW
IC-PIN	IC10-10	IC10-6	IC10-4	IC10-3	IC11-12	IC11-14
MODE						
CONT	0	⅄ (0)	1	0	1	0
TRIG	0	⅄	1	0	1	0
GATE	0	⅄ (0)	1	0	1	0
EXT WIDTH	1	0	1	0	1	0
TRIG BURST	1	0	0	⊔	1	0
CONT DBL	0	⅄	1	0	1	0
TRIG DBL	0	⅄	1	0	0	⅄
GATE DBL	0	⅄	1	0	1	0

Parenthetical entry indicates that WIDTH is set to ⊓⊔

Table 6-4. Width Mode Control Truth Table

SIGNAL	WRFC	WRF	WSC	WSORC
IC-PIN	IC12-14	IC12-15	IC13-4	IC13-3
MODE				
CONT	0	⎍ (0)	0	0 (1)
TRIG	0	⎍	1	0 (0)
GATE	0	⎍ (0)	0	0 (1)
EXT WIDTH	1	0	1	0 (0)
TRIG BURST	0	⎍ (0)	0	0 (1)
CONT DBL	0	⎍	1	0 (0)
TRIG DBL	0	⎍	1	0 (0)
GATE DBL	0	⎍	1	0 (0)

Parenthetical entry indicates that WIDTH is set to ⊓⊔
⎍ Pulse width depends on WIDTH setting

Table 6-5. Level Control Dependent Voltages

Level Control Knob Setting	Output Waveform Into 50Ω	E23 Voltage Upper Level	E25 Voltage Lower Level	IC2-6 Voltage (Offset)	IC3-6 Voltage (Gain)	TP6 Preamp Output Voltage	+18V Supply	−18V Supply
	+10 ———	+12	−12	−9.2	0	−3.6	+27.6	− 7.6
	+10 0	+12	0	−4.6	−6	0 −3.6	+27.6	− 7.6
	+5 −5	+ 6	+ 6	0	−6	+1.8 −1.8	+17.6	−17.6
	0 ———	0	0	0	0	0	+17.6	−17.6
	0 −10	0	+12	+4.6	−6	+3.6 0	+ 7.6	−27.6
	−10 ———	−12	+12	+9.3	0	+3.6	+ 7.6	−27.6

Table 6-6. X-Y Multiplier Voltages

NOTE
Set voltages at E23 and E25 to 0V before making measurements.

Pin Of MC1476	Voltage
1	−4.0
2	−4.6
3	−4.6
4	−4.0
5	−7.6
6	+4.6*
7	NC
8	0
9	NC
10	0
11	NC
12	+4.6*
13	NC
14	−12

*Use 1 kΩ isolation resistor

Table 6-7. Output Amplifier Voltages

Device	Base	Emitter	Collector
Q30	0.0	− 0.6	+ 1.2
Q31	0.0	− 0.6	+ 5.0
Q32	+ 1.2	+ 0.6	+14.9
Q33	+15.0	+14.4	+16.3
Q34	+12.5	+13.1	≈ 0 } Equal
Q35	−12.5	−13.1	≈ 0 }
Q36	−15.0	−14.4	−16.3
Q37	+14.4	+15.0	+ 1.2
Q38	−14.4	−15.0	− 1.2
Q39	+ 0.72	+ 0.12	+17.4
Q40	− 0.72	− 0.12	−17.4
Q41	+ 0.72	+ 0.12	+17.4
Q42	− 0.72	− 0.12	−17.4

Table 6-8. Preamp Voltage Levels

Device	Base	Emitter	Collector
Q13	+ 4.6	+ 4.0	+12.0
Q14	+ 4.0	+ 4.6	− 4.0
Q15	−10.4	−11.0	− 1.8
Q16	+ 4.0	+ 4.6	− 1.8
Q17	+ 4.6	+ 4.0	+12.0
Q18	− 1.8	− 1.2	− 6.9
Q19	+ 0.7	+ 0.1	+ 5.6
Q20	− 0.7	− 0.1	− 6.9
TP6	0		

SECTION 7
PARTS AND SCHEMATICS

7.1 DRAWINGS

The following assembly drawings (with parts lists) and schematics are in the arrangement shown below.

7.2 ORDERING PARTS

When ordering spare parts, please specify part number, circuit reference, board, serial number of unit and, if applicable, the function performed.

7.3 ADDENDA

Under Wavetek's product improvement program, the latest electronic designs and circuits are incorporated into each Wavetek instrument as quickly as development and testing permit. Because of the time needed to compose and print instruction manuals, it is not always possible to include the most recent changes in the initial printing. Whenever this occurs, addendum pages are prepared to summarize the changes made and are inserted immediately inside the rear cover. If no such pages exist, the manual is correct as printed.

Drawings	Drawing No.
Instrument Schematic	0004-00-0099
Chassis	
Parts List	1101-00-0567
Parts Locator	0102-00-0567
Timing Board	
Schematic	0103-00-0566
Parts List	1100-00-0566
Parts Locator	0100-00-0566
Assembly (sheet 1 of 2 NOT USED)	0101-00-0566
Transition Time Board	
Schematic	0103-00-0563
Parts List	1100-00-0563
Parts Locator	0100-00-0563
Assembly (sheet 1 of 2 NOT USED)	0101-00-0563

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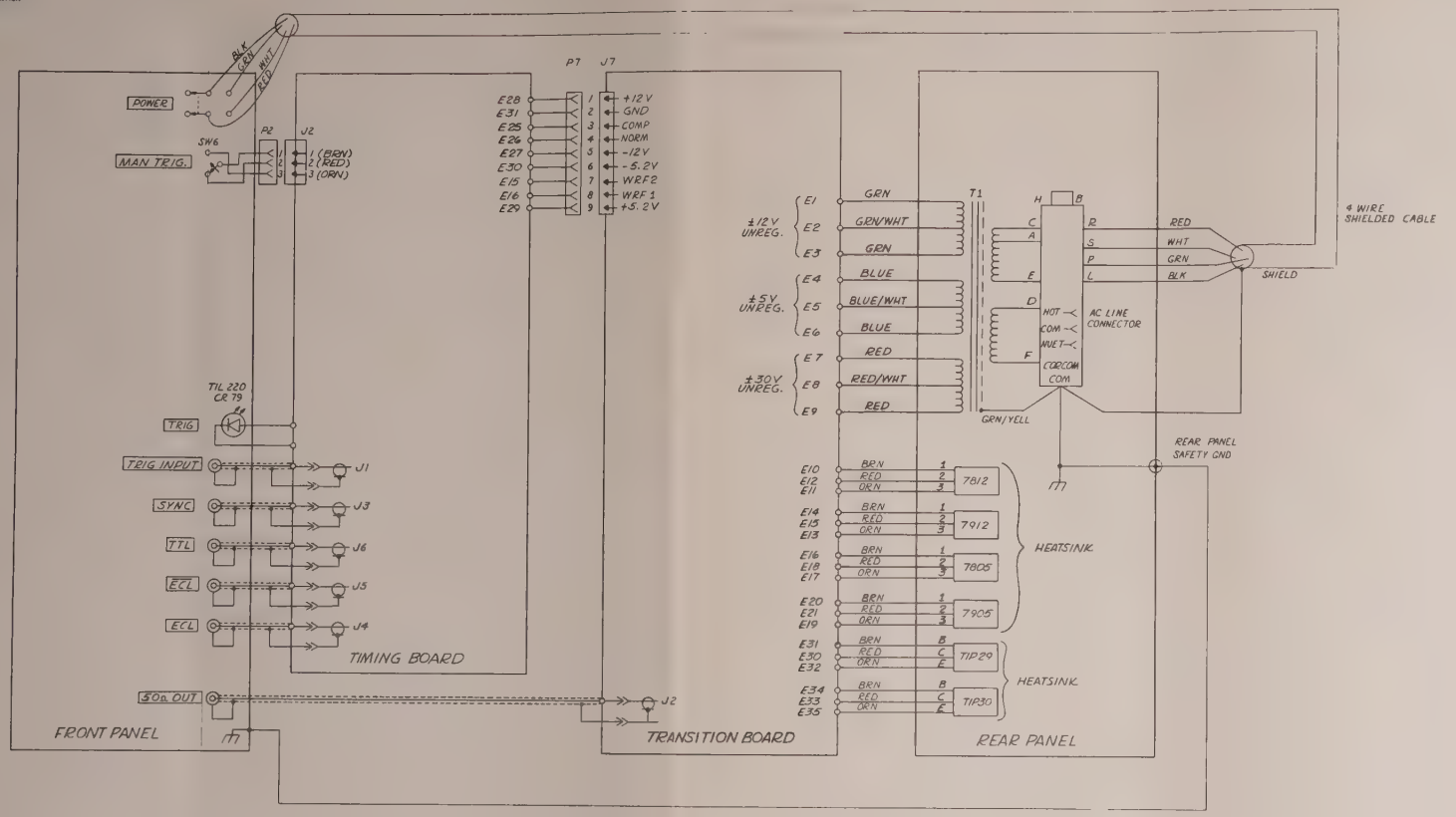
REV	ECN	BY	DATE	APP
A	ECN #2099	DC	2-13-80	



NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN D. COOPER 2-27-79
PROJ. ENG.
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES 1° XX .030
DO NOT SCALE DWG
SCALE

WAVETEK SAN DIEGO, CALIFORNIA

TITLE
INSTRUMENT SCHEMATIC

MODEL NO 801
DWG NO 0004-00-0079
REV A
SIZE D
CAGE IDENT 23338
SHEET 1 OF 1

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG. CHASSIS	0102-00-0567	WVTK	0102-00-0567	1
T1	TRANSFORMER	801-573	WVTK	1204-00-0573	1
NONE	ASSY. TOP COVER	1206-00-1013	WVTK	1206-00-1013	1
NONE	ASSY. BOTTOM COVER	1206-00-1014	WVTK	1206-00-1014	1
5	EXPANDER	180-301	WVTK	1430-00-5010	2
7	SHIELD, PWR	1400-00-6210	WVTK	1400-00-6210	1
8	PANEL FT	1400-00-6790	WVTK	1400-00-6790	1
9	PANEL, REAR	1400-00-6803	WVTK	1400-00-6803	1
10	HEATSINK REF 3200-06-0033	1400-00-6903	WVTK	1400-00-6903	2
11	BKT, ANGLE	1400-00-6913	WVTK	1400-00-6913	2
13	LABEL WARNING	1400-00-6940	WVTK	1400-00-6940	1
15	END BELL	1400-00-6984	WVTK	1400-00-6984	1
NONE	INSULATOR, PWR SWITCH REF 1600-99-0001	1400-00-8370	WVTK	1400-00-8370	2
12	I.D. LABEL	1400-00-9090	WVTK	1400-00-9090	1
16	BNC CONN	KC-7946	KING	2100-01-0002	6
17	RECEPTACLE	6VJ1	CORCM	2100-03-0026	1
18	CABLE CONTACT	226286-2	AMP	2100-03-0040	6

WAVETEK PARTS LIST — TITLE: CHASSIS — ASSEMBLY NO 1101-00-0567 — PAGE 1 — REV E

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
P2	HOUSING, CONN 3-POS	87499-3	AMP	2100-03-0042	1
19	SOLDER LUG	1497	SMITH	2100-04-0012	7
20	SOLDER LUG	1485-6	SMITH	2100-04-0025	3
21	PINS, CONN	87667-2	AMP	2100-05-0030	3
22	STD KNOB	RB-67-1-SB-M	ROGAN	2400-01-0008	5
23	COAX KNOB SET	RB-67-1-SB+0-M-9	ROGAN	2400-01-0009	4
25	FUSE, 6/10A, 250V, S-B	MDL 6/10	BUSS	2400-03-0016	1
NONE	CLAMP, CABLE	833	SMITH	2800-00-0022	1
26	BUSHING NYLINER	4L2FF	THOMN	2800-01-0002	9
27	BEARING PANEL	119	SMITH	2800-01-0004	1
28	STANDOFF, MALE/FEMALE 1.750 H, .250 HEX 6-32	1475-M03-F05-832	UNICP	2800-02-0010	4
29	STANDOFF, MALE/FEMALE 2.375 H, .250 HEX 4-40	1495-M03-F05-440	UNICP	2800-02-0011	4
30	STANDOFF 1.750 H, .250 HEX 4-40	P-609-M03-F05-440	WVTK	2800-02-0016	4
NONE	INSERT # 6	74-11-106-13	SOTCO	2800-09-0017	2

WAVETEK PARTS LIST — TITLE: CHASSIS — ASSEMBLY NO 1101-00-0567 — PAGE 2 — REV E

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
33	WASHER, SHOULDER	266B	SMITH	2800-27-0004	12
Q22	TRANS	TIP-29	TI	4902-00-0290	1
Q27	TRANS	TIP-30	TI	4902-00-0300	1
34	SWITCH ASSY PB	5102-00-0008	WVTK	5102-00-0008	1
35	SWITCH, TOGGLE	7108 P3DCWN	C&K	5106-00-0006	1
39	WIRE, HU, 18GA	MH0603-GRN/YELLOW	JUDD	6000-31-8045	1
36	WIRE, HU, 22GA	15U-BRDWN	GAVTT	6000-32-2001	1
37	WIRE, HU, 22GA	15U-RED	GAVTT	6000-32-2002	1
38	WIRE, HU, 22GA	15U-ORANGE	GAVTT	6000-32-2003	1
40	WIRE COAX	BTX019-10050	BRKTC	6001-40-0005	10
41	CABLE, 4 COND, 20GA	8722	BELDN	6001-70-0007	2
42	PWR CORD	6001-80-0005	WVTK	6001-80-0005	1
VR1	IC	MC7812CT	MOT	7000-78-1200	1
VR4	IC	MC7905CP	MOT	7000-79-0500	1
VR2	IC	7912	MOT	7000-79-1200	1
VR3	VOLTAGE REGULATOR	MA7805UC	FAIR	8000-78-0500	1

WAVETEK PARTS LIST — TITLE: CHASSIS — [illegible] NO 1101-00-0567 — PAGE 3 — REV E

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES — MATERIAL — FINISH WAVETEK PROCESS — DRAWN — DATE — PROJ/ENGR — RELEASE APPROV — TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1° XX ± .030 — DO NOT SCALE DWG — SCALE

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: PARTS LIST, CHASSIS

MODEL NO 801 — DWG NO 1101-00-0567 — REV E — CODE IDENT 23338 — SHEET 1 OF 1

7-8

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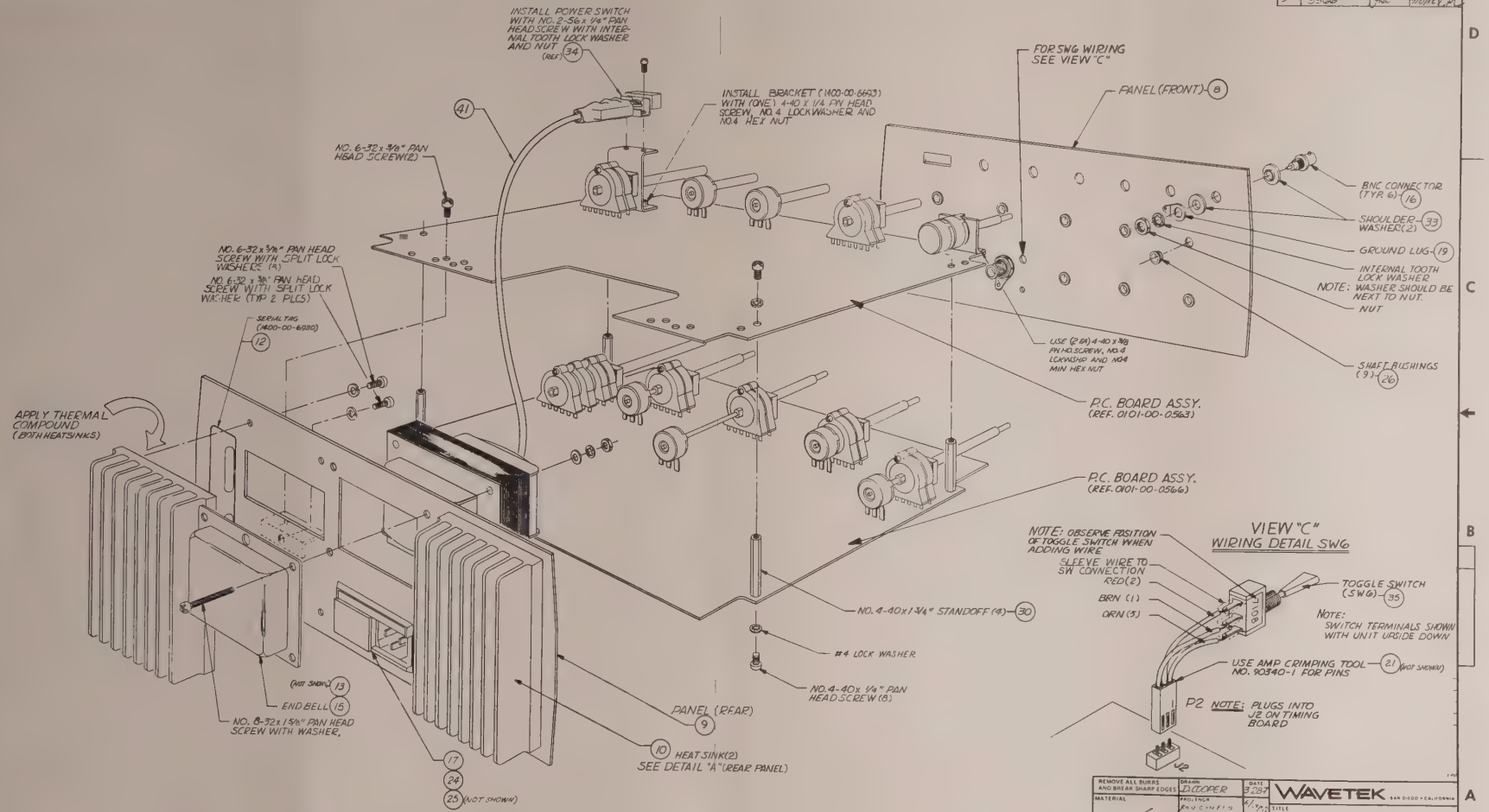
REV	ECN	BY	DATE	APP
B	# 331	[illegible]	3	[illegible]
C	# 2049	DC	12/08/80	[illegible]
D	2597	[illegible]	11-17-81	[illegible]
/	# 2966	[illegible]	1-18-82	[illegible]
/	3142 (Cal #7)	[illegible]	4-15-82	[illegible]
/	3366	[illegible]	11/02/82	[illegible]


INSTALL POWER SWITCH WITH NO. 2-56 x 3/16" PAN HEAD SCREW WITH INTERNAL TOOTH LOCK WASHER AND NUT (34) (REF.)
INSTALL BRACKET (1400-00-6633) WITH (ONE) 4-40 x 1/4 PH. HEAD SCREW, NO. 4 LOCKWASHER AND NO.4 HEX NUT
FOR SWG WIRING SEE VIEW "C"
PANEL (FRONT) (8)
41
NO. 6-32 x 3/8" PAN HEAD SCREW (2)
BNC CONNECTOR (TYP. 6) (16)
SHOULDER WASHER (2) (33)
GROUND LUG (19)
INTERNAL TOOTH LOCK WASHER
NOTE: WASHER SHOULD BE NEXT TO NUT.
NUT
SHAFT BUSHINGS (9) (26)
NO. 6-32 x 3/8" PAN HEAD SCREW WITH SPLIT LOCK WASHER (4)
NO. 6-32 x 3/8" PAN HEAD SCREW WITH SPLIT LOCK WASHER (TYP 2 PLCS)
SERIAL TAG (1400-00-6230) (12)
USE (2 EA) 4-40 x 3/8 PH HD SCREW, NO.4 LOCKWASHR AND NO4 MIN HEX NUT
P.C. BOARD ASSY. (REF. 0101-00-0563)
APPLY THERMAL COMPOUND (BOTH HEATSINKS)
P.C. BOARD ASSY. (REF. 0101-00-0566)
NO. 4-40 x 1-3/4" STANDOFF (4) (30)
#4 LOCK WASHER
NO. 4-40 x 1/4" PAN HEAD SCREW (8)
(NOT SHOWN) 13
END BELL (15)
NO. 8-32 x 1 5/8" PAN HEAD SCREW WITH WASHER.
PANEL (REAR) (9)
10 HEAT SINK (2) SEE DETAIL "A" (REAR PANEL)
17
24
25 (NOT SHOWN)
VIEW "C" WIRING DETAIL SWG
NOTE: OBSERVE POSITION OF TOGGLE SWITCH WHEN ADDING WIRE
SLEEVE WIRE TO SW CONNECTION
RED (2)
BRN (1)
ORN (3)
TOGGLE SWITCH (SWG) (35)
NOTE: SWITCH TERMINALS SHOWN WITH UNIT UPSIDE DOWN
USE AMP CRIMPING TOOL NO. 90340-1 FOR PINS
21 (NOT SHOWN)
P2 NOTE: PLUGS INTO J2 ON TIMING BOARD
J2

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN J.D. COOPER	DATE 3-25-81	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ. ENGR. [illegible]	APP'D [illegible]	TITLE ASSEMBLY STANDARD CHASSIS
FINISH WAVETEK PROCESS	RELEASE APP'D 12-7-81 11-17-82		
	TOLERANCE UNLESS OTHERWISE SPECIFIED XX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG. SCALE	MODEL NO. 801	DWG NO. 01-[illegible]-767 REV. [illegible]
		TOOL DWG. 23338	SHEET 1 OF 2

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REV	ECN	BY	DATE	APP

(REF - USE CRIMP TOOL #AMP 220141-1)

RG 174/U (J1 - J6) (6001-40-0005)

SHIELD

INSULATION 1/8"

COAX CENTER LEAD 1/8" (SOLID)

18

1/2"

COAX SOCKET 728387-9

SPRING SOCKET 3-330-808-9

PC BOARD (REF.)

VIEW "B"
TYP FOR J1, J2, J3, J4, J5, J6

27 PANEL BEARING

23 (4)

4
5 (2)

(5) 22

3/8" NUT

(REF) 19 #1457 SOLDER LUG

INT. TOOTH LOCKWASHER

GRN/YELL TO REAR PANEL GND ⏚ LUG #3 18GA

35 (REF)

28

Note 14

30

NO. 4-40 x 1/4" PAN HEAD SCREW (4)

#4 LOCK WASHER

29

SPECIAL COAX KNOB SET (1400-01-1427) 14 (1)

NO. 8-32 x 1 7/8" PAN HEAD SCREW (BLACK) (4)

VIEW "A"
CORCOM WIRING
(VIEW SHOWN WITH COVER REMOVED)
(SEE NOTE)

TRANSFORMER

1/2 LUG #2 GRN/YELL

(D) GRY

(E) BLK/WHT

(F) GRY/WHT

1/2 LUG #2

BLK (C)

ORN (A)

SLEEVE HARNESS

ORN JUMPER (B, H)

BLK (P)

RED (S)

WHT (L)

GRN (R)

TO POWER SWITCH

NOTE:
INSTALL COVER USING (6EA) 6-32 x 3/16 PAN HD SCREW - NO. 6 LCKWSHR AND NG - HEX NUT, (WITH ITEM NO 7 ON OUTSIDE OF COVER)

GRN/YELL 18GA FROM CORCOM TO SEPARATE REAR PANEL GROUND (LUG #1)

NOTE UNLESS OTHERWISE SPECIFIED

REAR PANEL WIRING
DETAIL "A"

ADD 2 FISH PAPER INSULATORS (P/N 1400-00-8370) BEFORE SHRINK TUBING

WHT

BLK

DOUBLE SHRINK TUBING

34

GRN

RED

NO. 4-40 x 1/4" PAN HEAD SCREW WITH NYLON WASHER (6 PLCS.)

TRANS. TO BE INSULATED AND THERMAL COMPOUND ON BOTH SIDES OF INSULATORS

RED, E9

RED/WHT, E8

RED, E7

GRN, E3

GRN/WHT, E2

GRN, E1

BLUE, E6

BLU/WHT, E5

BLUE, E4

AMP 280100-0322

WAVETEK
1204-00-0573
T1

E34
E33
E35
E31
E30
E32

E12
E11
E10
E15
E13
E14
E16
E17
E18
E19
E20

VIEW A

6

18GA GRN/YELL LUG #1 (STRUP ASSEMBLY SAME AS FOR LUGS 2 (3))

WHT/GRN (SHIELD) FROM PWR CABLE TO ⏚ (LUG #3)

GRN/YELL 18GA

FRONT PANEL GND ⏚ REF.

6-32 x 3/8" SOCKET HEAD CAP SCREW

PANEL

NO. 6 SPLIT LOCK WASHER

6-32 FLEX LOCK NUT

NO 6 FLAT LUG #485-6 (2) 20

REAR PANEL GND LUG ASSEMBLY

FRONT PANEL WIRING
(BNC CONNECTORS)

TTL

ECL

R L

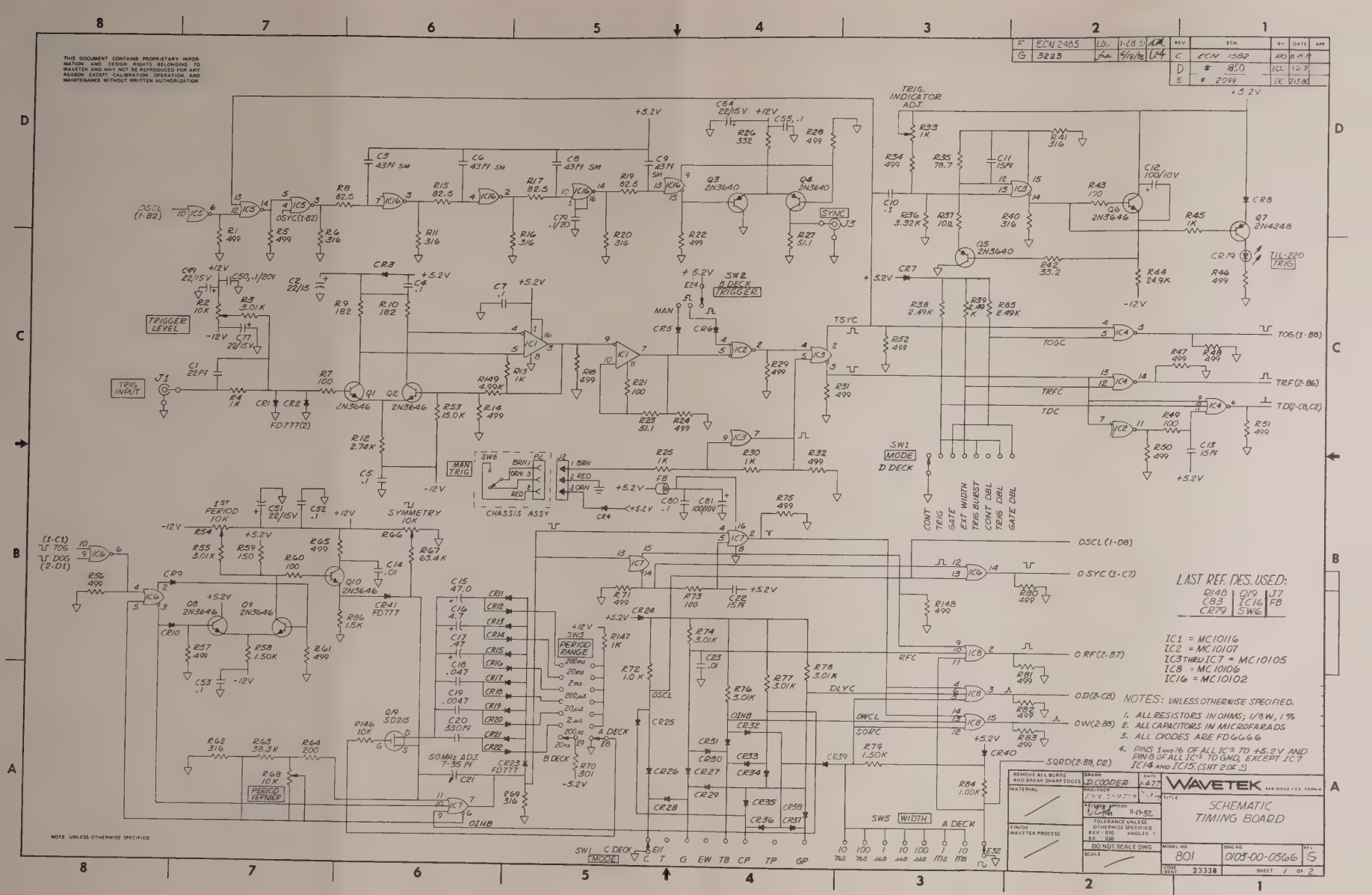
RING PRINT

J1
J3
J6
J5
J4
J2

TO TIMANT BOARD (ITEM NO 40, 6 PLCS.)

TO TRANSIT ON TIME BOARD. SLEEVE J2 CONNECTION WITH SHRINK SLEEVING.

MATERIAL	DRN	J. PEP	7-8-87	WAVETEK SAN DIEGO, CALIFORNIA
	CHK	RON COVELLO		
FINISH WAVETEK PROCESS	APPROV		1-17-88	ASSEMBLY STANDARD CHASSIS
	DO NOT SCALE DWG			SIZE D, DWG NO 1400-00-0567, REV D
				SCALE NONE, SHEET 2 OF 2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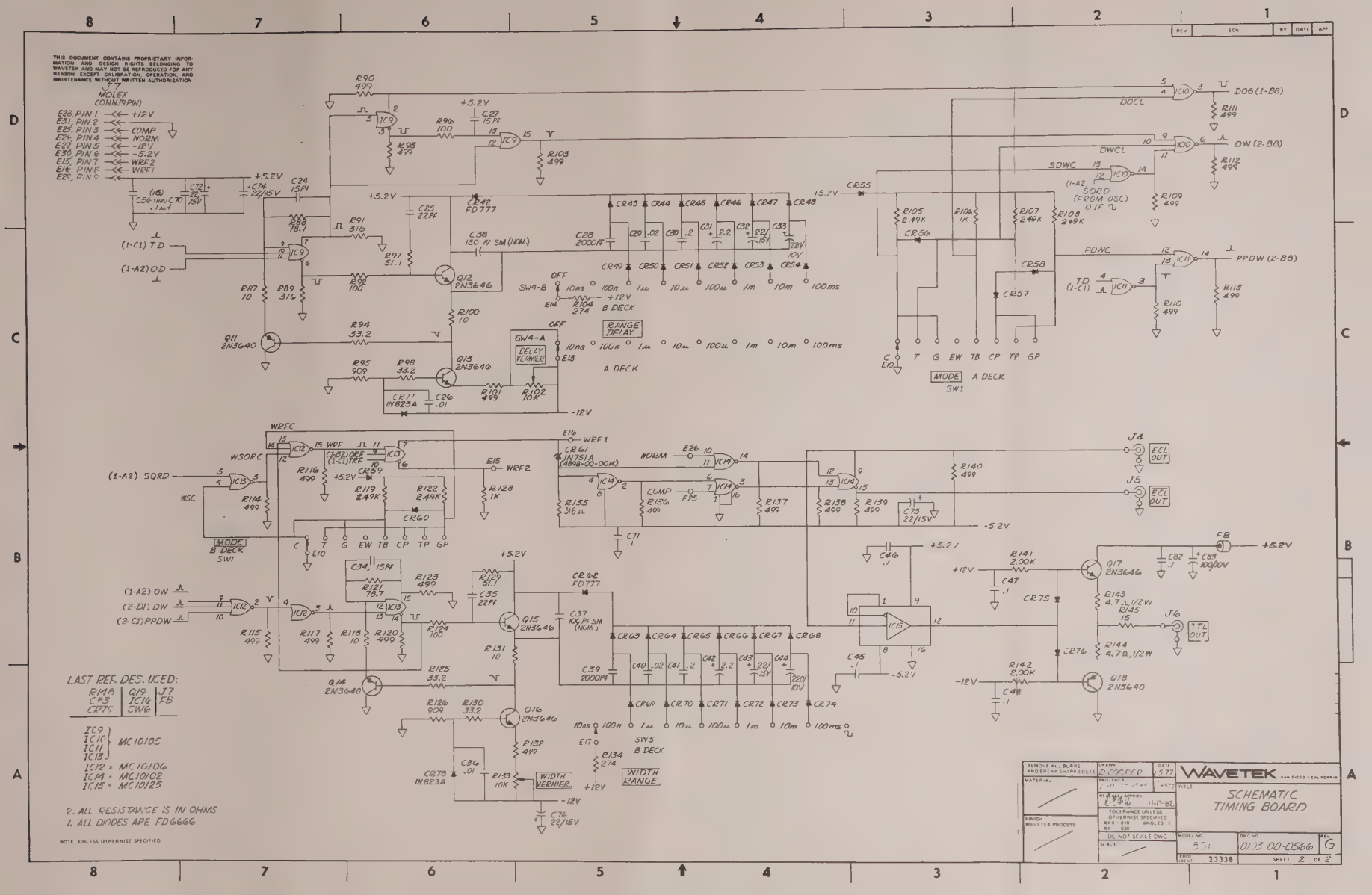
F ECN 2485 LDL 1-28-92 KM
G 3223 fm 6/18/92 LM
REV ECN BY DATE APP
C ECN 1582 RD 8 M
D # 1850 EC 12 8
E # 2099 DC 2/3 92
TRIG. INDICATOR ADJ.
+5.2V
-12V
OSCL (1-B2)
OSYC (1-B2)
SYNC
TRIGGER LEVEL
TRIG INPUT
FD777(2)
2N3646
MAN TRIG
CHASSIS ASSY
SW2 A DECK TRIGGER
MAN
TSYC
TOGC
TRFC
TDC
TOG (1-B8)
TRF (2-B6)
TDR (2-C8, C2)
SW1 MODE D DECK
CONT TRIG
GATE
EXT WIDTH
TRIG BURST
CONT DBL
TRIG DBL
GATE DBL
TIL-220 TRIG
1ST PERIOD
SYMMETRY
(1-C1) TOG
(2-D1) DOG
SW3 PERIOD RANGE
200ns
20ns
2ms
200µs
20µs
2µs
200ns
20ns
A DECK
B DECK
50MHz ADJ. 7-35 Pf
PERIOD VERNIER
OIHB
SW1 C DECK MODE
C T G EW TB CP TP GP
SW5 WIDTH A DECK
10 ns 100 ns 1 µs 10 µs 100 µs 1 ms 10 ms
OSCL (1-D8)
OSYC (1-C7)
ORF (2-B7)
OD (2-C8)
OW (2-B8)
SQRD (2-B8, D2)
LAST REF. DES. USED:
R148 Q19 J17
C83 IC16 FB
CR79 SW6
IC1 = MC10116
IC2 = MC10107
IC3 THRU IC7 = MC10105
IC8 = MC10016
IC16 = MC10102
NOTES: UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTORS IN OHMS; 1/8W, 1%
2. ALL CAPACITORS IN MICROFARADS
3. ALL DIODES ARE FD6666
4. PINS 1 AND 16 OF ALL IC'S TO +5.2V AND PIN 8 OF ALL IC'S TO GND, EXCEPT IC7 IC14 AND IC15. (SHT 2 OF 2)
NOTE UNLESS OTHERWISE SPECIFIED
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN D. CODER 1-6-77
PROGRAM
APPROV 11-17-92
TOLERANCE UNLESS OTHERWISE SPECIFIED ANGLES ± .5° .XX ± .010 .XXX ± .005
DO NOT SCALE DWG
SCALE
WAVETEK SAN DIEGO, CA, FORM
TITLE SCHEMATIC TIMING BOARD
MODEL NO 801
DWG NO 0103-00-0566
REV S
CODE IDENT 23338
SHEET 1 OF 2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MOLEX CONN.(9 PIN)
E28, PIN 1 +12V
E31, PIN 2
E25, PIN 3 COMP
E26, PIN 4 NORM
E27, PIN 5 -12V
E30, PIN 6 -5.2V
E15, PIN 7 WRF2
E16, PIN 8 WRF1
E29, PIN 9
(1-C1) TD
(1-A2) OD
(1-A2) SQRD
WSORC
WSC
(1-A2) OW
(2-D1) DW
(2-C3) PPDW
DOG (1-B8)
DW (2-B8)
PPDW (2-B8)
SDWC
DOCL
DWCL
PDWC
SQRD (FROM OSC) 01F
RANGE DELAY
DELAY VERNIER
SW4-A
SW4-B
A DECK
B DECK
MODE A DECK SW1
MODE B DECK SW1
WIDTH VERNIER
WIDTH RANGE
SW5 B DECK
ECL OUT
TTL OUT
C E10 T G EW TB CP TP GP
LAST REF. DES. USED:
R148 C83 CR75
Q19 IC16 CW6
J7 FB
IC9 IC10 IC11 IC13 MC10105
IC12 = MC10106
IC14 = MC10102
IC15 = MC10125
2. ALL RESISTANCE IS IN OHMS
1. ALL DIODES ARE FD6666
NOTE UNLESS OTHERWISE SPECIFIED
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN C. COOPER
TOLERANCE UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DWG
WAVETEK SAN DIEGO, CALIFORNIA
SCHEMATIC TIMING BOARD
MODEL NO 531
DWG NO 0133-00-0566
REV G
CODE IDENT 23338
SHEET 2 OF 2

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG TIMING BD	0101-00-0566	WVTK	0101-00-0566	1
NONE	SCHEMATIC TIMING BD	0103-00-0566	WVTK	0103-00-0566	1
NONE	PLATE, SW	008-004	WVTK	1400-00-2130	5
C14 C23 C26 C36	CAP. CER. MN. .01MF, 50V	CAC022S5U103Z100A	CORNG	1500-01-0310	4
C10 C4 C45 C46 C47 C48 C5 C50 C52 C53 C55 C56 C57 C58 C59 C60 C61 C62 C63 C64 C65 C66 C67 C68 C69 C7 C70 C71 C79 C80 C82	CAP. CER. MON. .1MF, 50V	CAC03Z5U104Z050A	CORNG	1500-01-0405	31
C11 C13 C22 C24 C27 C34	CAP. CER. 15PF. 1KV	DD-150	CRL	1500-01-5011	6
C1 C25 C35	CAP. CER. 22PF. 1KV	DD-220	CRL	1500-02-2011	3
C38T	CAP. MICA. 150PF. 500V	DM15-151J	ARCO	1500-11-3100	1
C28 C39	CAP. MICA. 2000PF. 500V	DM19-202J	ARCO	1500-12-0200	2
C20	CAP. MICA. 330PF. 500V	DM15-331J	ARCO	1500-13-3100	1
C3 C6 C8 C9	CAP. MICA. 43PF. 500V	DM15-430J	ARCO	1500-14-3000	4
C37T	CAP. MICA. 82PF. 500V	DM15-820J	[illegible]	1500-18-2000	1
C29 C40	CAP. MYLR. .02MF, 100V	BA18203F	IMB	1500-42-0304	2
C30 C41	CAP. MYLR. .2MF. 100V	BA18204F	IMB	1500-42-0404	2

WAVETEK PARTS LIST | TITLE TIMING BD | ASSEMBLY NO 1100-00-0566 PAGE 1 | REV H

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
6	SPRING SOCKET	50935-1	AMP	2100-03-0039	4
NONE	TERM	200581	USECO	2100-05-0010	1
NONE	PIN	08-50-0105	MOLEX	2100-05-0023	9
2	STANDOFF, SWAGE .125 M. .187 DIA 2-56, .062 MAT'L	S8153-10-5A	JNICP	2800-03-0006	7
NONE	BALUN CORE	28[illegible]3000902	FARIT	3100-00-0002	2
R33	POT. TRIM. 1K	91A1R1K	BECK	4600-01-0209	1
R54 R66	POT. TRIM. 10K	91A1R10K	BECK	4600-01-0313	2
R2	POT. CONT. 10K FROM 4600-01-0312	4609-71-0304	WVTK	4609-71-0304	1
R68	POT. CONT. 10K FROM 4600-01-0312	4609-71-0305	WVTK	4609-71-0305	1
R102	POT. CONT. 10K FROM 4600-01-0312	4609-71-0306	WVTK	4609-71-0306	1
R133	POT. CONT. 10K FROM 4600-01-0312	4609-71-0307	WVTK	4609-71-0307	1
R143 R144	RES. C. 1/2W. 5% 4.7	RC20F-4R7	STKPL	4700-25-0479	2
R124 R21 R43 R49 R60 R7 R73 R92 R96	RES. MF. 1/8W. 1% 100	RN55D-1000F	TRW	4701-03-1000	9
R106 R128 R13 R147	RES. MF. 1/8W. 1% 1K	RN55D-1001F	TRW	4701-03-1001	10

WAVETEK PARTS LIST | TITLE TIMING BD | ASSEMBLY NO. 1100-00-0566 PAGE 3 | REV H

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R70					
R11 R135 R16 R20 R40 R41 R6 R62 R69 R89 R91	RES. MF. 1/8W. 1% 316	RN55D-3160F	TRW	4701-03-3160	11
R26	RES. MF. 1/8W. 1% 332	RN55D-3320F	TRW	4701-03-3320	1
R36	RES. MF. 1/8W. 1% 3.32K	RN55D-3321F	TRW	4701-03-3321	1
R125 R130 R42 R94 R98	RES. MF. 1/8W. 1% 33.2	RN55D-33R2F	TRW	4701-03-33R2	5
R63	RES. MF. 1/8W. 1% 38.3K	RN55D-3832F	TRW	4701-03-3832	1
R1 R101 R103 R109 R110 R111 R112 R113 R114 R115 R116 R117 R120 R123 R132 R136 R137 R138 R139 R14 R140 R148 R18 R22 R24 R28 R29 R31 R32 R34 R4 R47 R48 R5 R50 R51 R52 R56 R57 R61 R65 R71 R75 R80 R81 R82 R83 R90 R93	RES. MF. 1/8. 1% 499	RN55D-4990F	TRW	4701-03-4990	49
R149	RES. MF. 1/8W. 1% 4.99K	RN55D-4991F	TRW	4701-03-4991	1
R129 R23 R27 R97	RES. MF. 1/8W. 1% 51.1	RN55D-51R1F	TRW	4701-03-5119	4
R67	RES. MF. 1/8W. 1% 63.4K	RN55D-6342F	TRW	4701-03-6342	1
R121 R35 R88	RES. MF. 1/8W. 1% 78.7	RN55D-78R7F	TRW	4701-03-7879	3
R15 R17 R19 R8	RES. MF. 1/8W. 1% 82.5	RN55D-82R5F	TRW	4701-03-8259	4

WAVETEK PARTS LIST | TITLE TIMING BD | ASSEMBLY NO 1100-00-0566 PAGE 5 | REV H

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C19	CAP. MYLR. .0047MF 100V	WMF-1D47	CDE	1500-44-7214	1
C18	CAP. MYLR. .047MF. 100V	WMF-1S47	CDE	1500-44-7304	1
C21	CAP. VARI. 7-35PF. 250V	7S TRIKD-22. 7/35PF	TRIKO	1500-53-5010	1
C12 C31 C33	CAP. TANT. 100MF. 10V	196D107X9010PE4	SPRAG	1500-71-0711	3
C31 C42	CAP. TANT. 2.2MF. 25V	196D225X9025MA1	SPRAG	1500-72-2502	2
C2 C32 C43 C49 C51 C54 C72 C74 C75 C76 C77	CAP. TANT. 22MF. 20V	202A2002226M3	MATSO	1500-72-2621	11
C32 C44	CAP. TANT. 220MF. 10V	196D227X9010TE4	SPRAG	1500-72-2701	2
C17	CAP. TANT. .47MF. 50V	130D474X9050B2	SPRAG	1500-74-7403	1
C16	CAP. TANT. 4.7MF. 35V	150D475X9035B2	SPRAG	1500-74-7502	1
C15	CAP. TANT. 47MF. 20V	196D476X9020PE4	SPRAG	1500-74-7601	1
NONE	TIMING BOARD	1700-00-0566	WVTK	1700-00-0566	1
1	SHIELD TIMING BOARD	1700-00-0610	WVTK	1700-00-0610	1
NONE	CONN. 9PIN	09-50-7091	MOLEX	2100-02-0051	1
J2	3 POS HEADER	87348-3	AMP	2100-03-0036	1
4	SPRING SOCKET	3-330-808-9	AMP	2100-03-0037	5
J1 J3 J4 J5 J6	COAX SOCKET	226287-2	AMP	2100-03-0038	5

WAVETEK PARTS LIST | TITLE TIMING BD | ASSEMBLY NO 1100-00-0566 PAGE 2 | REV H

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R25 R30 R4 R45 R72 R84					
R146	RES. MF. 1/8W. 1% 10K	RN55D-1002F	TRW	4701-03-1002	1
R100 R118 R131 R37 R87	RES. MF. 1/8W. 1% 10	RN55D-10R0F	TRW	4701-03-1009	5
R59	RES. MF. 1/8W. 1% 150	RN55D-1500F	TRW	4701-03-1500	1
R50 R79 R86	RES. MF. 1/8W. 1% 1.5K	RN55D-1501F	TRW	4701-03-1501	3
R53	RES. MF. 1/8W. 1% 15K	RN55D-1502F	TRW	4701-03-1502	1
R145	RES. MF. 1/8W. 1% 15	RN55D-15R0F	TRW	4701-03-1509	1
R10 R9	RES. MF. 1/8W. 1% 182	RN55D-1820F	TRW	4701-03-1820	2
R64	RES. MF. 1/8W. 1% 200	RN55D-2000F	TRW	4701-03-2000	1
R141 R142	RES. MF. 1/8W. 1% 2K	RN55D-2001F	TRW	4701-03-2001	2
R105 R107 R108 R119 R122 R38 R39 R85	RES. MF. 1/8W. 1% 2.49K	RN55D-2491F	TRW	4701-03-2491	8
R44	RES. MF. 1/8W. 1% 24.9K	RN55D-2492F	TRW	4701-03-2492	1
R104 R134	RES. MF. 1/8W. 1% 274	RN55D-2740F	TRW	4701-03-2740	2
R12	RES. MF. 1/8W. 1% 2.74K	RN55D-2741F	TRW	4701-03-2741	1
R70	RES. MF. 1/8W. 1% 301	RN55D-3010F	TRW	4701-03-3010	1
R3 R55 R74 R76 R77	RES. MF. 1/8W. 1% 3.01K	RN55D-3011F	TRW	4701-03-3011	6

WAVETEK PARTS LIST | TITLE TIMING BD | ASSEMBLY NO 1100-00-0566 PAGE 4 | REV H

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R126 R95	RES. MF. 1/8W. 1% 909	RN55D-9090F	TRW	4701-03-9090	2
CR77 CR78	DIODE, ZENER 6.2V	1N823A	MOT	4801-01-0823	2
CR1 CR2 CR23 CR41 CR42 CR62	DIODE	FD777	FAIR	4807-02-0777	6
CR10 CR11 CR12 CR13 CR14 CR15 CR16 CR17 CR18 CR19 CR20 CR21 CR22 CR24 CR25 CR26 CR27 CR28 CR29 CR3 CR30 CR31 CR32 CR33 CR34 CR35 CR36 CR37 CR38 CR39 CR4 CR40 CR43 CR44 CR45 CR46 CR47 CR48 CR49 CR5 CR50 CR51 CR52 CR53 CR54 CR55 CR56 CR57 CR58 CR59 CR6 CR60 CR63 CR64 CR65 CR66 CR67 CR68 CR69 CR7 CR70 CR71 CR72 CR73 CR74 CR75 CR76 CR8 CR9	DIODE	1N4148	FAIR	4807-02-6666	69
CR61	DIODE, SEL. 1N751A QTY 1 4801-01-0751		WVTK	4898-00-0014	1
CR79	LED	TIL-220	TI	4899-00-0006	1
Q11 Q14 Q18 Q3 Q4 Q5	TRANS	2N3640	FAIR	4901-03-6400	6
Q1 Q10 Q12 Q13 Q15	TRANS	2N3646	NSC	4901-03-6460	11

WAVETEK PARTS LIST | TITLE TIMING BD | ASSEMBLY NO 1100-00-0566 PAGE 6 | REV H

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATER AL	PRO. ENGR		TITLE: PARTS LIST TIMING BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES 1 XX ±.02		MODEL NO 801 | DWG NO 1100-00-0566 | REV H
	DO NOT SCALE DWG		CONTR NO 23338 | SHEET 1 OF 2
	SCALE		

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
Q16 Q17 Q2 Q6 Q8 Q9					
Q7	TRANS	2N4248	FAIR	4901-04-2480	1
Q19	TRANS	SD2150E	SIG	4902-00-2140	1
NONE	WAFER	147-400	WVTK	5104-02-0015	12
NONE	SWITCH STOP	213-33-001-01-22	CTS	5104-07-0003	5
NONE	DETENT, MOD FROM 5104-01-0010	5104-99-0033	WVTK	5104-99-0033	1
NONE	DETENT, MOD FROM 5104-01-0010	5104-99-0034	WVTK	5104-99-0034	1
NONE	DETENT, MOD FROM 5104-01-0010	5104-99-0035	WVTK	5104-99-0035	3
NONE	WIRE, HU, 140A	140A-RED	BRDRX	6000-31-4002	2
NONE	WIRE, HU, 140A	140A-WHITE	BRDRX	6000-31-4009	2
NONE	WIRE, HU, 220A	15U-BLACK	GAVTT	6000-32-2000	1
NONE	WIRE, HU, 220A	15U-BROWN	GAVTT	6000-32-2001	2
NONE	WIRE, HU, 220A	15U-ORANGE	GAVTT	6000-32-2003	2
NONE	WIRE, HU, 220A	15U-YELLOW	GAVTT	6000-32-2004	2
NONE	WIRE, HU, 220A	15U-GREEN	GAVTT	6000-32-2005	2
NONE	WIRE, HU, 220A	15U-BLUE	GAVTT	6000-32-2006	2

WAVETEK PARTS LIST | TITLE TIMING BD | ASSEMBLY NO 1100-00-0566 | PAGE 7 | REV H

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	WIRE, HU, 220A	15U-VIOLET	GAVTT	6000-32-2007	2
NONE	WIRE, HU, 220A	15U-GRAY	GAVTT	6000-32-2008	2
NONE	WIRE, HU, 220A	15U-WHITE/RED	GAVTT	6000-32-2092	1
NONE	WIRE, HU, 220A	15U-WHITE/ORANGE	GAVTT	6000-32-2093	1
IC14 IC16	IC	MC10102	MOT	8001-01-0200	2
IC10 IC11 IC13 IC3 IC4 IC5 IC6 IC7 IC9	IC	MC10105	MOT	8001-01-0500	9
IC12 IC8	IC	MC10106	MOT	8001-01-0600	2
IC2	IC	MC10107	MOT	8001-01-0700	1
IC1	IC	MC10116P	MOT	8001-01-1600	1
IC15	IC	MC10123P	MOT	8001-01-2300	1

WAVETEK PARTS LIST | TITLE TIMING BD | ASSEMBLY NO 1100-00-0566 | PAGE 8 | REV H

REMOVE ALL BURRS AND BREAK SHARP EDGES | MATERIAL | FINISH WAVETEK PROCESS | DRAWN | DATE | PROJ ENGR | RELEASE APPROV | TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±10 ANGLES ±1 XX ±.02 | DO NOT SCALE DWG | SIZE

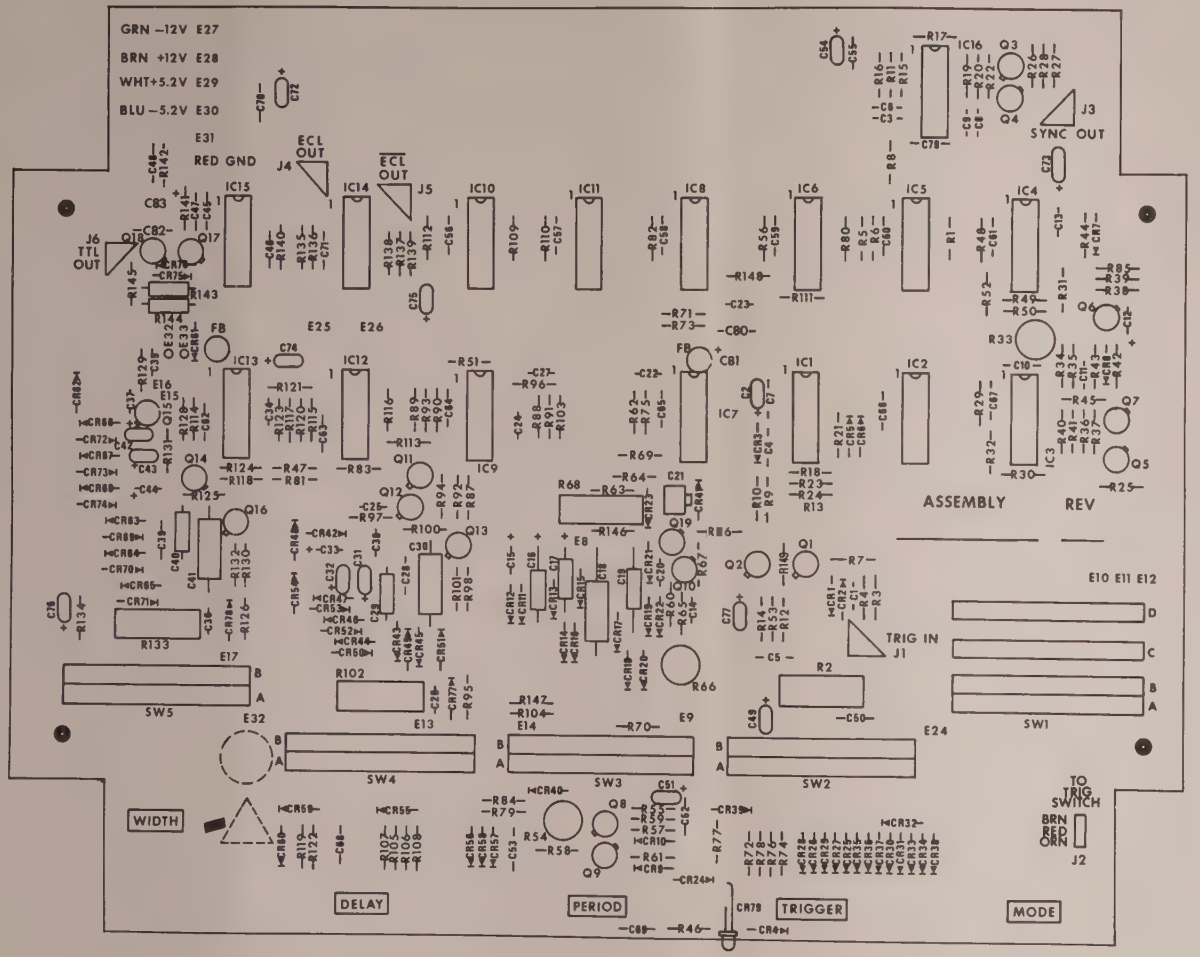
WAVETEK SAN DIEGO, CALIFORNIA

PARTS LIST
TIMING BD

MODEL NO 901 | DRG NO 1100-00-0566 | REV H

23338 | SHT 2 OF 2

NOTE UNLESS OTHERWISE SPECIFIED



WAVETEK

ASSEMBLY, TIMING BOARD

801	0100-00-0566

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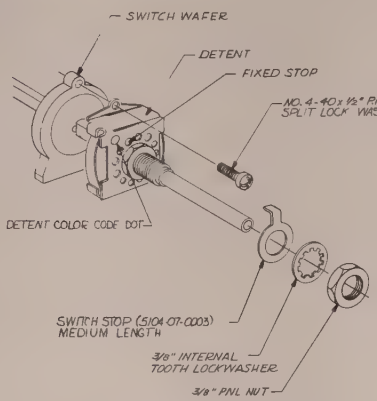
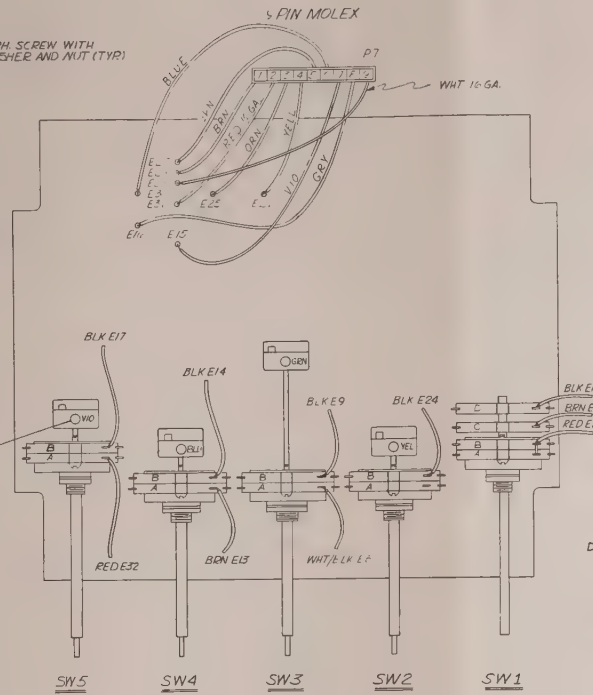
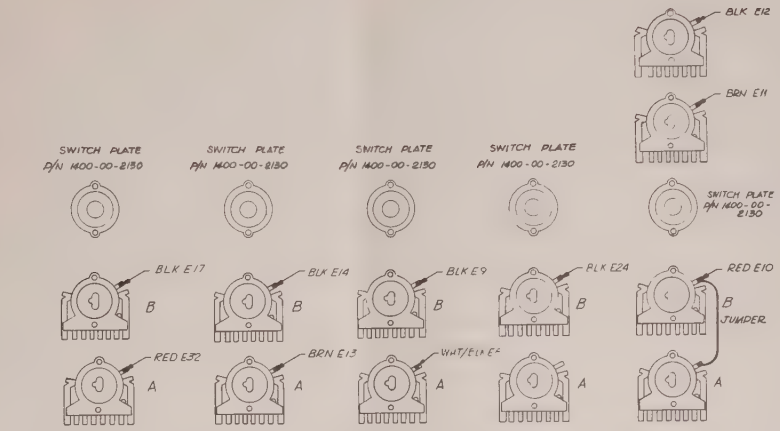
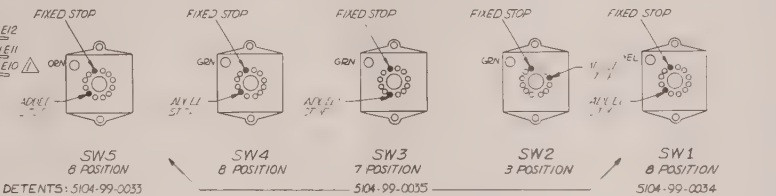
REV	ECN	BY	DATE	APP


SWITCH WAFER
DETENT
FIXED STOP
NO. 4-40 x 1/8" P.H. SCREW WITH SPLIT LOCK WASHER AND NUT (TYP.)
DETENT COLOR CODE DOT
SWITCH STOP (5104-07-0003) MEDIUM LENGTH
3/8" INTERNAL TOOTH LOCKWASHER
3/8"-PNL NUT

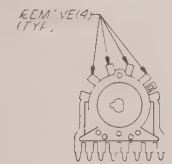
TYPICAL HARDWARE STACK-UP







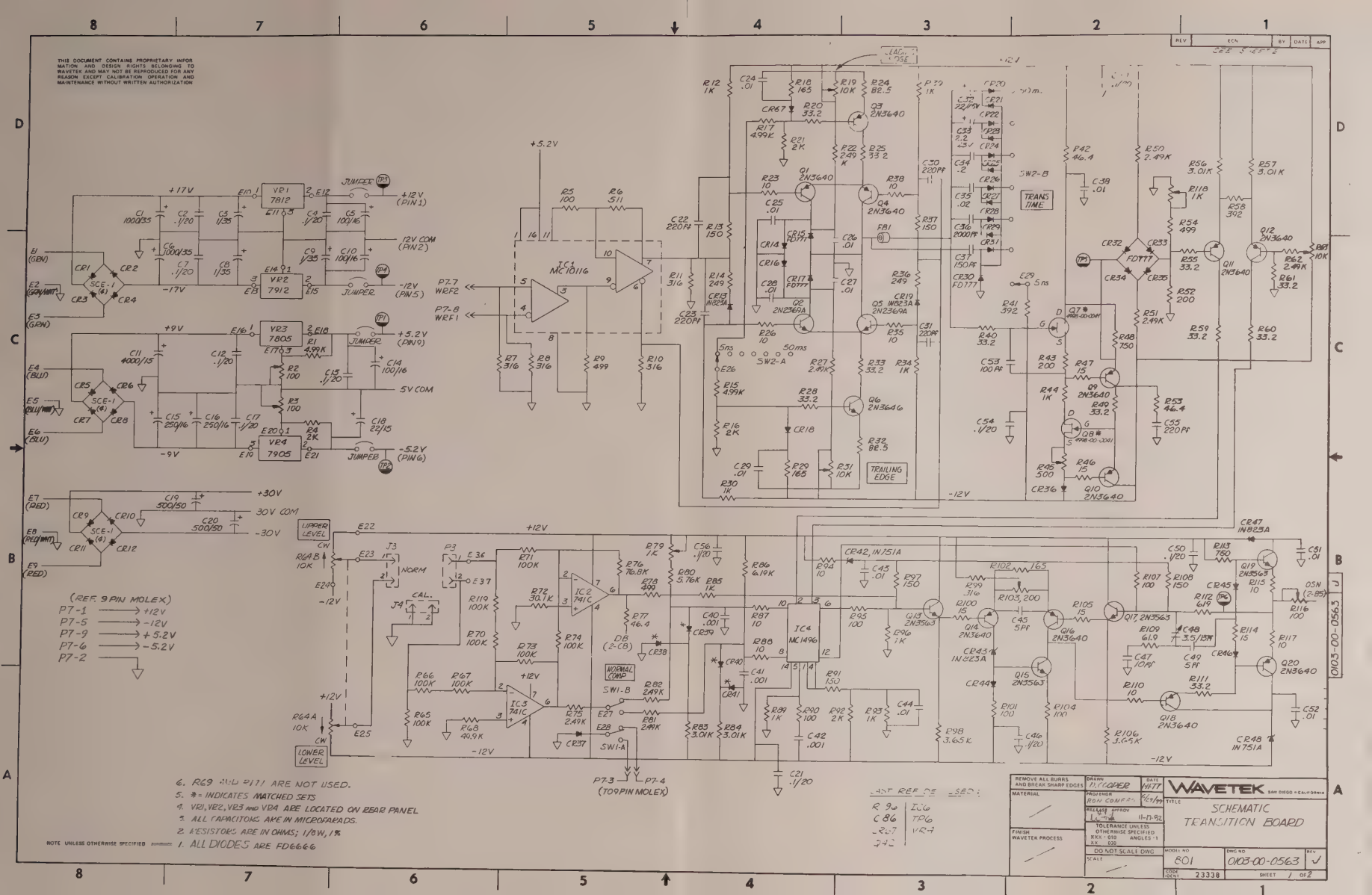
DETENTS SHOWN FROM FRONT VIEW IN FULL COUNTER CLOCKWISE POSITION



⚠ STRIP E10 WIRE BACK TO FORM JUMPER BETWEEN WAFER A & B SW1

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN D COOPER	DATE 9-31-7	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJECTION FOR MFG		TITLE ASSEMBLY TIMING BOARD
FINISH WAVETEK PROCESS	RELEASE APPROV	11-17-97	
	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES 1 XX .030		MODEL NO 801
	DO NOT SCALE DWG		DWG NO 0101-00-0566 REV K
	SCALE		CODE IDENT 23338 SHEET 2 OF 2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REV ECN BY DATE APP
SEE SHEET 2
+17V
-17V
+9V
-9V
+30V
30V COM
-30V
+5.2V
+12V
-12V
5V COM
12V COM
-5.2V
VR1 7812
VR2 7912
VR3 7805
VR4 7905
TC1 MC10116
IC2 741C
IC3 741C
IC4 MC1496
TRANS TIME
TRAILING EDGE
SW2-A
SW2-B
SW1-A
SW1-B
UPPER LEVEL
LOWER LEVEL
NORMAL COMP
CAL.
NORM
(REF. 9 PIN MOLEX)
P7-1 → +12V
P7-5 → -12V
P7-9 → +5.2V
P7-6 → -5.2V
P7-2
P7-7 WRF2
P7-8 WRF1
P7-3
P7-4
(TO 9 PIN MOLEX)
6. RG9 AND R171 ARE NOT USED.
5. * = INDICATES MATCHED SETS
4. VR1, VR2, VR3 AND VR4 ARE LOCATED ON REAR PANEL
3. ALL CAPACITORS ARE IN MICROFARADS.
2. RESISTORS ARE IN OHMS; 1/8W, 1%
1. ALL DIODES ARE FD6666
NOTE UNLESS OTHERWISE SPECIFIED
NOT REFERENCED: R96 C86 R67 R42 IC6 TP6 VR4
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN H. COOPER DATE 4/17
PROGRESS RON CONFER DATE 11/91
RELEASE APPROV DATE 11-11-92
TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .03
DO NOT SCALE DWG
SCALE
WAVETEK SAN DIEGO, CALIFORNIA
TITLE SCHEMATIC TRANSITION BOARD
MODEL NO 801
DWG NO 0103-00-0563
REV J
CODE IDENT 23338
SHEET 1 OF 2
0103-00-0563 J

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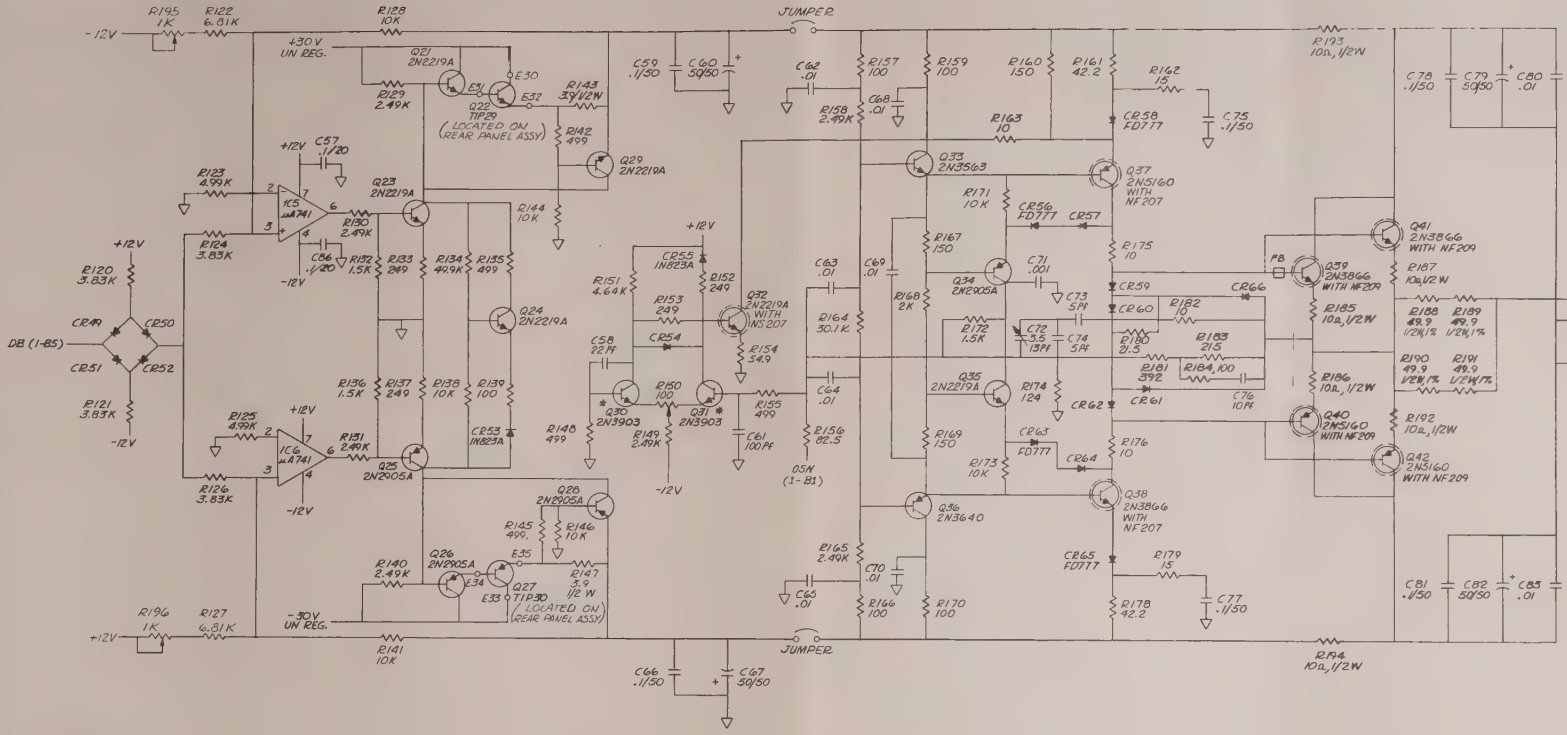
REV	ECN	BY	DATE	APP
C	[illegible] 1582	[illegible]	[illegible]	
E	[illegible]	DLW	3-22-79	
F	# 2000	DL	2/5/80	
G	2505 2017	[illegible]	[illegible]	
H	3122	[illegible]	[illegible]	
J	3632	[illegible]	[illegible]	
/	4047	KJ	[illegible]	



LAST REF. DES. USED:

R196	IC6
C146	TP6
CR67	VR4
Q42	

4. * = INDICATES MATCHED SETS
3. ALL CAPACITORS ARE IN MICROFARADS
2. RESISTORS ARE IN OHMS; 1/8W, 1%

NOTE UNLESS OTHERWISE SPECIFIED / ALL DIODES ARE FDG666

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN [illegible]	DATE 11/77
MATERIAL	PROJ. ENGR [illegible]	DATE 12/1/77
FINISH WAVETEK PROCESS	RELEASE [illegible]	APPROV 11-11-82
	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030	
	DO NOT SCALE DWG	
	SCALE	

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: SCHEMATIC TRANSITION BOARD

MODEL NO. 801 | DWG NO. 0103-00-0563 | REV J

CODE IDENT NO. 23338 | SHEET 2 OF 2

0103-00-0563 J

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REV	REVISION	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG TRANS TIME	0101-00-0563	WVTK	0101-00-0563	1
NONE	SCHEMATIC TRANS TIME	0103-00-0563	WVTK	0103-00-0563	1
NONE	PLATE,SW	008-004	WVTK	1400-00-2130	2
NONE	BRKT,POWER SWITCH	1400-00-6693	WVTK	1400-00-6693	1
3	BRACKET	1400-00-6923	WVTK	1400-00-6923	1
NONE	COAX KNOB SET QTY 1 2400-01-0009	1400-01-1429	WVTK	1400-01-1429	1
C45 C49 C73 C74	CAP.CER.5PF,1KV	DD-050	CRL	1500-00-5011	4
C47 C76	CAP.CER.10PF,1KV	DD-100	CRL	1500-01-0011	2
C93 C61	CAP.CER.100PF,1KV	DD-101	CRL	1500-01-0111	2
C40 C41 C42 C71	CAP.CER.,.001MF,1KV	DD-102	CRL	1500-01-0211	4
C24 C29 C26 C27 C28 C29 C38 C43 C44 C51 C52 C62 C63 C64 C65 C68 C69 C70 C80 C83	CAP.CER.MN.,.01MF,50V	CAC02Z5U103Z100A	CORNG	1500-01-0310	20
C12 C13 C17 C2 C21 C39 C4 C46 C50 C54 C56 C57 C59 C66 C7 C75 C77 C78 C81 C86	CAP.CER.MON.,.1MF,50V	CAC03Z5U104Z050A	CORNG	1500-01-0405	20
C98	CAP.CER.22PF,1KV	DD-220	CRL	1500-02-2011	1
C22 C23 C30 C31 C35	CAP.CER.220PF,1KV	DD-221	CRL	1500-02-2111	5

WAVETEK PARTS LIST | TITLE TRANSITION TIME | ASSEMBLY NO 1100-00-0563 | PAGE 1 | REV L

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	SPRING SOCKET	3-330-808-9	AMP	2100-03-0037	1
J9	COAX SOCKET	226287-2	AMP	2100-03-0038	1
J3 J4	HEADER,2-POS	87348-2	AMP	2100-03-0041	2
P3	HOUSING,2-POS	87499-3	AMP	2100-03-0043	1
NONE	SKT,IC,14 PIN	DILB14P/108	BURND	2100-03-0066	1
NONE	PINS,CONN	87667-2	AMP	2100-05-0030	2
1	HEAT SINK	207	WAKE	2800-11-0001	3
NONE	TRANSIPAD	10123N	METRS	2800-11-0003	9
NONE	TRANSIPAD	10180	METRS	2800-11-0004	7
2	HEATSINK	208	WAKE	2800-11-0008	4
FB1 FB2	FERRITE BEAD	56-590-65/3B	FERRX	3100-00-0001	2
R116 R150 R2 R3	POT,TRIM,100	91AR100	BECK	4600-01-0103	4
R118 R195 R196 R79	POT,TRIM,1K	91AR1K	BECK	4600-01-0209	4
R19 R31	POT,CONT,10K	JK-1303	CTS	4600-01-0302	2
R63	POT,TRIM,10K	91AR10K	BECK	4600-01-0313	1
R103	POT,TRIM,200	91AR200	BECK	4600-02-0101	1
R45	POT,TRIM,500	91AR500	BECK	4600-02-0104	1

WAVETEK PARTS LIST | TITLE TRANSITION TIME | ASSEMBLY NO 1100-00-0563 | PAGE 3 | REV L

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R172 R46 R47					
R102 R10 R29	RES.MF.1/8W.1%.165	RN55D-1650F	TRW	4701-03-1650	3
R43 R52	RES.MF.1/8W.1%.200	RN55D-2000F	TRW	4701-03-2000	2
R16 R168 R21 R4 R92	RES.MF.1/8W.1%.2K	RN55D-2001F	TRW	4701-03-2001	5
R183	RES.MF.1/8W.1%.215	RN55D-2150F	TRW	4701-03-2150	1
R180	RES.MF.1/8W.1%.21.5	RN55D-21R5F	TRW	4701-03-2159	1
R133 R137 R14 R152 R153 R36	RES.MF.1/8W.1%.249	RN55D-2490F	TRW	4701-03-2490	6
R129 R130 R131 R140 R149 R158 R165 R22 R27 R50 R51 R62 R75 R81 R82	RES.MF.1/8W.1%.2.49K	RN55D-2491F	TRW	4701-03-2491	13
R56 R57 R83 R84	RES.MF.1/8W.1%.3.01K	RN55D-3011F	TRW	4701-03-3011	4
R164 R72	RES.MF.1/8W.1%.30.1K	RN55D-3012F	TRW	4701-03-3012	2
R10 R11 R7 R8 R99	RES.MF.1/8W.1%.316	RN55D-3160F	TRW	4701-03-3160	5
R111 R20 R25 R28 R33 R40 R49 R55 R59 R60 R61	RES.MF.1/8W.1%.33.2	RN55D-33R2F	TRW	4701-03-3329	11
R106 R98	RES.MF.1/8W.1%.3.65K	RN55D-3651F	TRW	4701-03-3651	2
R120 R121 R124 R126	RES.MF.1/8W.1%.3.83K	RN55D-3831F	TRW	4701-03-3831	4
R181 R41 R58	RES.MF.1/8W.1%.392	RN55D-3920F	TRW	4701-03-3920	3

WAVETEK PARTS LIST | TITLE TRANSITION TIME | ASSEMBLY NO 1100-00-0563 | PAGE 5 | REV L

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C37	CAP.MICA.150PF.500V	DM15-151J	ARCO	1500-11-5100	1
C36	CAP.MICA.2000PF.500V	DM19-202J	ARCO	1500-12-0200	1
C10 C14 C5	CAP.ELECT.100MF.16V	500D1070016DC7	SPRAG	1500-31-0101	3
C1 C6	CAP.ELECT.1000MF.35V	39D10800350L6	SPRAG	1500-31-0212	2
C15 C16	CAP.ELECT.250MF.16V	500D2570016DF7	SPRAG	1500-32-5101	2
C11	CAP.ELECT.4000MF.15V	39D40800015JL4	SPRAG	1500-34-0201	1
C60 C67 C79 C82	CAP.ELECT.30MF.50V	500D3060030DD7	SPRAG	1500-33-0003	4
C19 C20	CAP.ELECT.300MF.50V	39D30760309L4	SPRAG	1500-33-0103	2
C95	CAP.MYLR.,.02MF.100V	BA1B203F	IMB	1500-42-0304	1
C34	CAP.MYLR.,.2MF.100V	BA1B204F	IMB	1500-42-0404	1
C48 C72	VAR1.3.5-13PF.250V	78-TRIM0-02 3.5/13PF	TRIKO	1500-51-3000	2
C3 C8	CAP.TANT.1MF.35V	150D105X9035A2	SPRAG	1500-71-0502	2
C9	CAP.TANT.1MF.35V	196D105X0035HE1	SPRAG	1500-71-0512	1
C33	CAP.TANT.2.2MF.25V	196D225X9025MA1	SPRAG	1500-72-2502	1
C18 C32	CAP.TANT.22MF.20V	202A2002226M3	MATSO	1500-72-2621	2
NONE	TRANSITION TIME BD	1700-00-0563	WVTK	1700-00-0563	1
J1	CONN 9PIN	09-60-1091	MOLEX	2100-02-0052	1

WAVETEK PARTS LIST | TITLE TRANSITION TIME | ASSEMBLY NO 1100-00-0563 | PAGE 2 | REV L

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R64	POT,DUAL,10K,LINEAR	4600-21-0302	WVTK	4600-21-0302	1
R185 R186 R187 R192 R193 R194	RES.C.1/2W.5%.10	RC20GF-100	STKPL	4700-25-0100	6
R143 R147	RES.C.1/2W.5%.3.9	RC20GF-3R9	STKPL	4700-25-0399	2
R101 R104 R107 R129 R157 R159 R166 R170 R184 R5 R90 R95	RES.MF.1/8W.1%.100	RN55D-1000F	TRW	4701-03-1000	12
R12 R30 R34 R39 R44 R85 R89 R93 R96	RES.MF.1/8W.1%.1K	RN55D-1001F	TRW	4701-03-1001	9
R128 R138 R141 R144 R146 R171 R173	RES.MF.1/8W.1%.10K	RN55D-1002F	TRW	4701-03-1002	7
R119 R65 R66 R67 R70 R71 R73 R74	RES.MF.1/8W.1%.100K	RN55D-1003F	TRW	4701-03-1003	8
R110 R115 R117 R163 R175 R176 R182 R23 R26 R35 R38 R87 R88 R94	RES.MF.1/8W.1%.10	RN55D-10R0F	TRW	4701-03-1009	14
R174	RES.MF.1/8W.1%.124	RN55D-1240F	TRW	4701-03-1240	1
R108 R13 R160 R167 R169 R37 R91 R97	RES.MF.1/8W.1%.150	RN55D-1500F	TRW	4701-03-1500	8
R132 R136 R172	RES.MF.1/8W.1%.1.5K	RN55D-1501F	TRW	4701-03-1501	3
R100 R105 R114 R162	RES.MF.1/8W.1%.15	RN55D-15R0F	TRW	4701-03-1509	7

WAVETEK PARTS LIST | TITLE TRANSITION TIME | ASSEMBLY NO 1100-00-0563 | PAGE 4 | REV L

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R161 R178	RES.MF.1/8W.1%.42.2	RN55D-42R2F	TRW	4701-03-4229	2
R151	RES.MF.1/8W.1%.4.64K	RN55D-4641F	TRW	4701-03-4641	1
R42 R53 R77	RES.MF.1.8W.1%.46.4	RN55D-46R4F	TRW	4701-03-4649	3
R135 R142 R145 R148 R155 R54 R78 R9	RES.MF.1/8.1%.499	RN55D-4990F	TRW	4701-03-4990	8
R1 R123 R125 R15 R17	RES.MF.1/8W.1%.4.99K	RN55D-4991F	TRW	4701-03-4991	5
R134 R68	RES.MF.1/8W.1%.49.9K	RN55D-4992F	TRW	4701-03-4992	2
R6	RES.MF.1/8W.1%.511	RN55D-5110F	TRW	4701-03-5110	1
R154	RES.MF.1/8W.1%.54.9	RN55D-5489F	TRW	4701-03-5499	1
R80	RES.MF.1/8W.1%.5.76K	RN55D-5761F	TRW	4701-03-5761	1
R112	RES.MF.1/8W.1%.619	RN55D-6190F	TRW	4701-03-6190	1
R86	RES.MF.1/8W.1%.6.19K	RN55D-6191F	TRW	4701-03-6191	1
R109	RES.MF.1/8W.1%.61.9	RN55D-61R9F	TRW	4701-03-6199	1
R122 R127	RES.MF.1/8W.1%.6.81K	RN55D-6811F	TRW	4701-03-6811	2
R113 R48	RES.MF.1/8W.1%.750	RN55D-7500F	TRW	4701-03-7500	2
R76	RES.MF.1/8W.1%.76.8K	RN55D-7682F	TRW	4701-03-7682	1
R156 R24 R32	RES.MF.1/8W.1%.82.5	RN55D-82R5F	TRW	4701-03-8259	3
R180 R189 R190 R191	RES.MF.1/2W.1%.49.9	RN65D-49R9F	TRW	4701-23-4999	4

WAVETEK PARTS LIST | TITLE TRANSITION TIME | ASSEMBLY NO 1100-00-0563 | PAGE 6 | REV L

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES | DRAWN | DATE | MATERIAL | FINISH WAVETEK PROCESS | ENGINEER | RELEASE APPROV | TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX .010 ANGLES ±1 .XX .030 | DO NOT SCALE DWG | SCALE

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: PARTS LIST TRANSITION TIME

MFG NO 801 | DWG NO 1100-00-0563 | REV L | JOB NO 23338 | SHEET 1 OF 2

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
CR42 CR48	DIODE	1N751A	FAIR	4801-01-0751	2
CR13 CR19 CR43 CR47 CR53 CR55	DIODE, ZENER 6.2V	1N823A	MOT	4801-01-0823	6
CR1 CR10 CR11 CR12 CR2 CR3 CR4 CR5 CR6 CR7 CR8 CR9	DIODE	1N4002	FAIR	4801-02-0001	12
CR15 CR17 CR30 CR32 CR33 CR34 CR35 CR36 CR58 CR63 CR65	DIODE	FD777	FAIR	4807-02-0777	11
CR14 CR16 CR18 CR20 CR21 CR22 CR23 CR24 CR25 CR26 CR27 CR28 CR29 CR31 CR36 CR37 CR44 CR45 CR46 CR49 CR50 CR51 CR52 CR54 CR57 CR59 CR60 CR61 CR62 CR64 CR66 CR67	DIODE	1N414B	FAIR	4807-02-6666	32
CR38 CR39 CR40 CR41	DIODE, SET, 4-FD-6666 QTY 4 4807-02-6666	4898-00-0013	WVTK	4898-00-0013	1
Q21 Q23 Q24 Q29 Q32 Q33	TRANS	2N2219A	NSC	4901-02-2191	6
Q2 Q5	TRANS	2N2369A	MOT	4901-02-3691	2
Q25 Q26 Q28 Q34	TRANS	2N2905A	NSC	4901-02-9051	4
Q13 Q15 Q17 Q19 Q33	TRANS	2N3563	FAIR	4901-03-5630	5

WAVETEK PARTS LIST | TITLE TRANSITION TIME | ASSEMBLY NO 1100-00-0563 | REV L

PAGE 7

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
Q1 Q10 Q11 Q12 Q14 Q16 Q18 Q20 Q3 Q36 Q4 Q9	TRANS	2N3640	FAIR	4901-03-6400	12
Q6	TRANS	2N3646	NSC	4901-03-6460	1
Q30 Q39 Q41	TRANS	2N3866	MOT	4901-03-8660	3
Q37 Q40 Q42	TRANS	2N5160-18	MOT	4901-05-1600	3
Q7 Q8	TRANS, M/PR, 2N3495 QTY 2 4901-05-4850	142-501-53	WVTK	4998-00-0009	1
Q30 Q31	TRANS, M/PR/2N3903 QTY 2 4901-03-9030	182-503-102	WVTK	4998-00-0013	1
NONE	WAFER	147-400	WVTK	5104-02-0015	4
NONE	SWITCH STOP	215-33-001-01-22	CTS	5104-07-0003	2
NONE	DETENT, MOD FROM 5104-01-0010	5104-99-0036	WVTK	5104-99-0036	1
NONE	DETENT, MOD FROM 5104-01-0010	5104-99-0037	WVTK	5104-99-0037	1
NONE	WIRE, HU, 22GA	15U-BROWN	GAVTT	6000-32-2001	1
NONE	WIRE, HU, 22GA	15U-RED	GAVTT	6000-32-2002	1
NONE	WIRE, HU, 22GA	15U-ORANGE	GAVTT	6000-32-2003	1
NONE	WIRE, HU, 22GA	15U-YELLOW	GAVTT	6000-32-2004	1

WAVETEK PARTS LIST | TITLE TRANSITION TIME | ASSEMBLY NO 1100-00-0563 | REV L

PAGE 8

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	WIRE, HU, 22GA	15U-GREEN	GAVTT	6000-32-2005	1
NONE	WIRE, HU, 22GA	15U-BLUE	GAVTT	6000-32-2006	1
NONE	WIRE, HU, 22GA	15U-VIOLET	GAVTT	6000-32-2007	1
NONE	WIRE, HU, 22GA	15U-GRAY	GAVTT	6000-32-2008	1
IC2 IC3 IC5 IC6	IC	LM741CN	NSC	7000-07-4100	4
IC4	IC	MC1496P	MOT	7000-14-9600	1
IC1	IC	MC10116P	MOT	8001-01-1600	1

WAVETEK PARTS LIST | TITLE TRANSITION TIME | ASSEMBLY NO 1100-00-0563 | REV L

PAGE 9

NOTE UNLESS OTHERWISE SPECIFIED

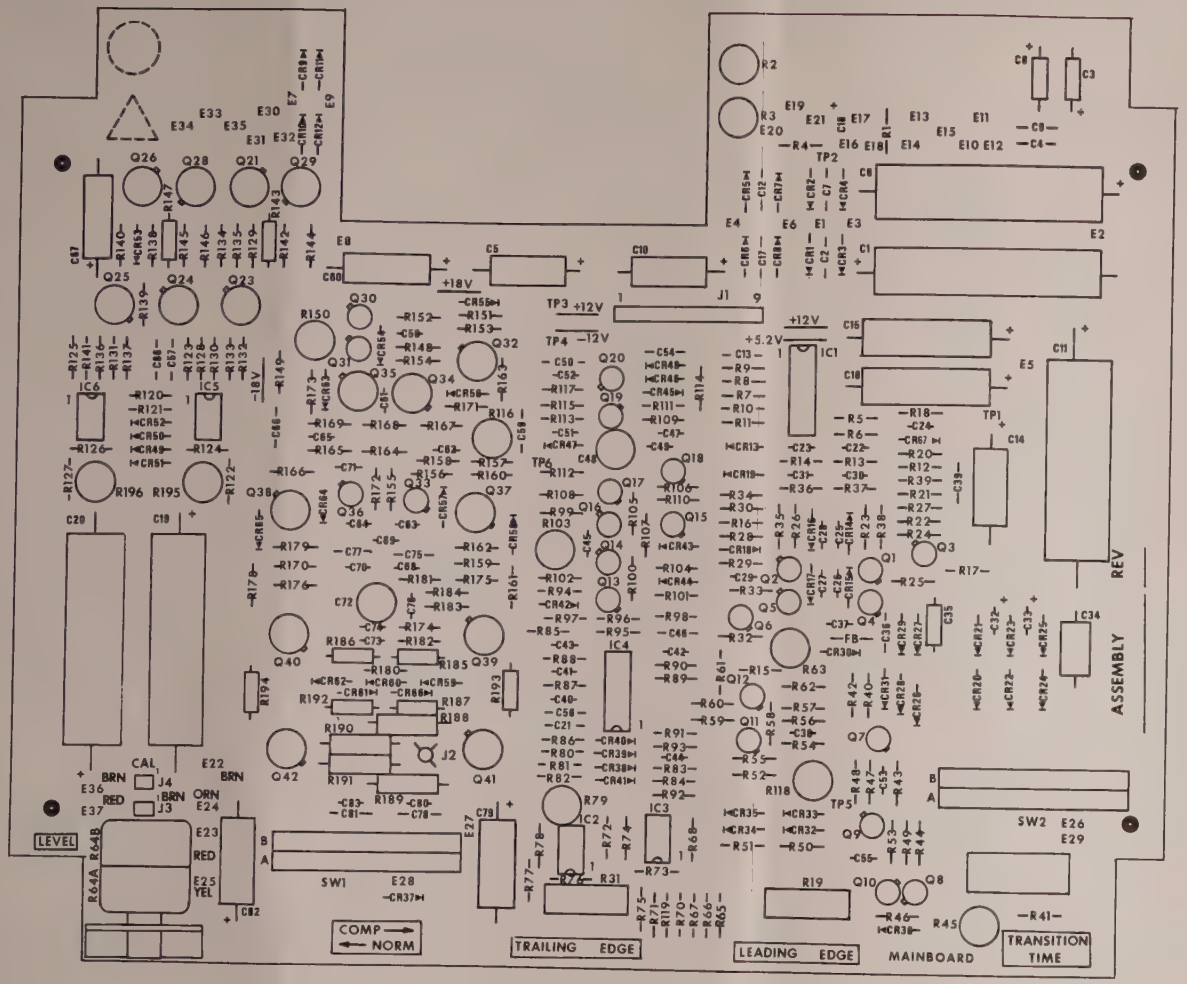
REMOVE ALL BURRS AND BREAK SHARP EDGES | MATERIAL | FINISH WAVETEK PROCESS | DRAWN | DATE | PROJ ENGR | RELEASE APPROV | TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES 1 XX .030 | DO NOT SCALE DWG | SCALE

WAVETEK SAN DIEGO, CALIFORNIA

TITLE: PARTS LIST TRANSITION TIME

M DEC NO 801 | DWG NO 1100-00-0563 | REV L

SIZE A | CAGE NO 23338 | SHEET 2 OF 2



WAVETEK

ASSEMBLY, TRANSITION BOARD

801	0100-00-0563

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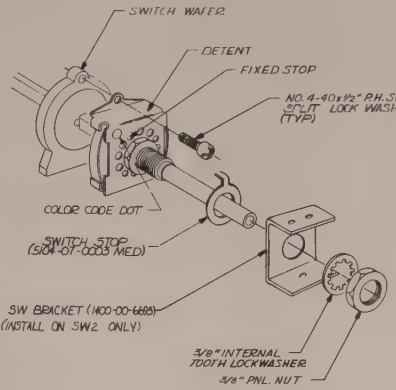
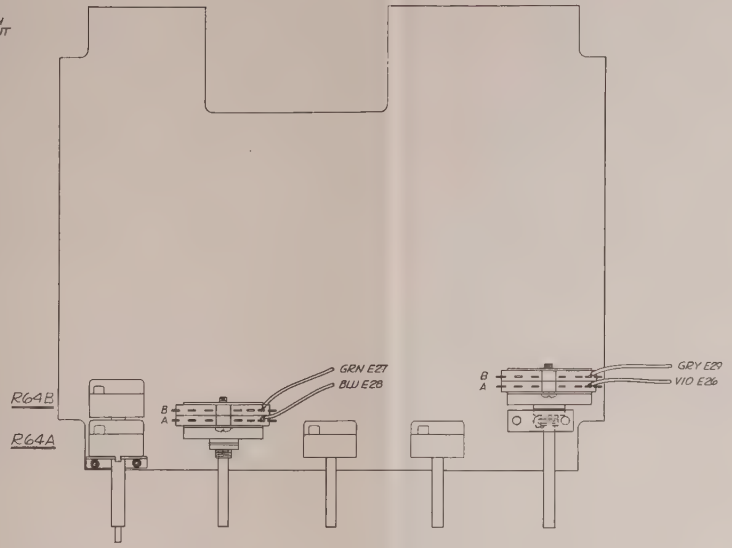
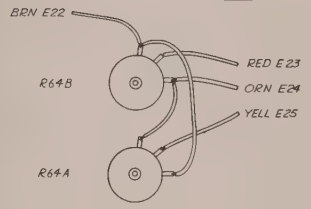
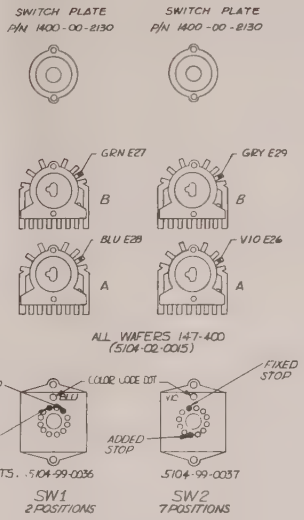
REV	ECN	BY	DATE	APP


SWITCH WAFER
DETENT
FIXED STOP
NO. 4-40 x 1/2" P.H. SCREW WITH SPLIT LOCK WASHER AND NUT (TYP)
COLOR CODE DOT
SWITCH STOP (5104-01-0005 MED)
SW BRACKET (1400-00-6693) (INSTALL ON SW2 ONLY)
3/8" INTERNAL TOOTH LOCKWASHER
3/8" PNL. NUT

TYPICAL HARDWARE STACK-UP







DETENTS SHOWN FROM FRONT VIEW IN FULL COUNTER CLOCKWISE POSITION

2. INSTALL BRACKET 1400-00-6693 INTO SW2 PRIOR TO WAVE SOLDER. CHASSIS DWG. HAS BRKT. TO BRD. INSTALLATION AFTER WAVE.
1. INSTALL 2N4 AND BRACKET AFTER WAVE SOLDER. SEE DWG 2102-00-0567, BRKT. #1400-00-6693

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN D. COMPTON	DATE 3-3-77	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROFINDR		TITLE ASSEMBLY TRANSITION BOARD
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG	MODEL NO 567	DWG NO 0001-00-0563 REV M
	SCALE	CODE IDENT 23338	SHEET 2 OF 2

GLOSSARY OF PULSE TERMS

PULSE TERMS

Amplitude

The maximum absolute peak value of a pulse measured from the baseline and excluding unwanted aberrations or overshoot. Measurement points are at 50% of the pulse duration time (pulse high level) and on the baseline (pulse low level) at 50% of the off time (the pulse period minus the pulse duration).

Aberrations

Unwanted deviations or excursions in the pulse shape from an ideal square corner and flat top; namely, overshoot, undershoot or rounding, ringing, and tilt or slope.

Baseline

The quiescent dc voltage reference level of the pulse waveform.

Complementary Pulse

Normal pulse with high and low levels interchanged. Pulse on-time becomes pulse off-time.

Duty Factor

Sometimes referred to as duty cycle. The ratio of pulse duration to period. Duty factor in % = Duration/Period X 100.

Falltime

The time interval, at the pulse trailing edge, for the pulse amplitude to fall from the 90% amplitude level to the 10% amplitude level.

Flatness

The drop of the pulse top, excluding overshoot, ringing or pulse rounding. Sometimes referred to as tilt or slope.

High Level

The most positive value of a pulse, regardless of unwanted aberrations or overshoot, measured at a point that is located at 50% of the pulse duration.

Low Level

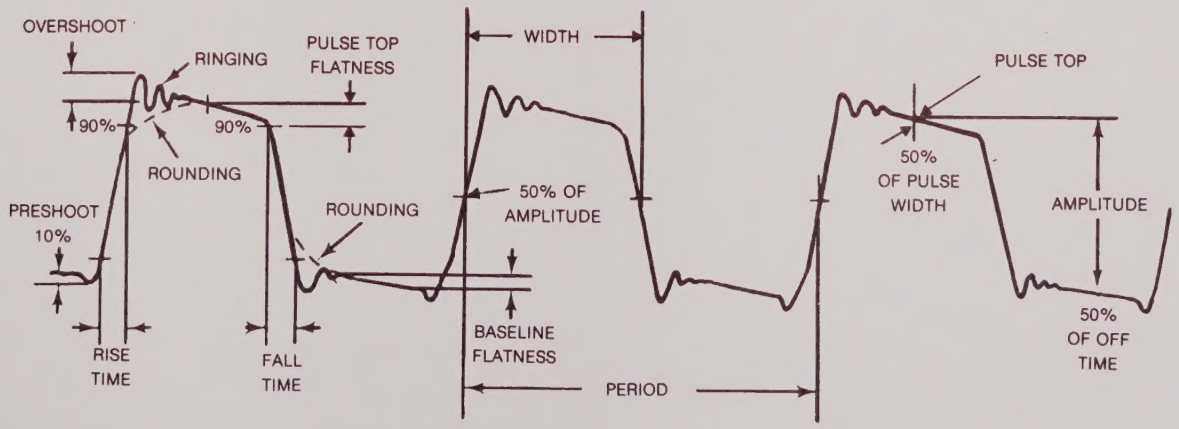
The most negative value of a pulse, regardless of unwanted aberrations or overshoot, measured at a point that is 50% of the off time.

Offset

A dc potential of either polarity applied to the waveform to bias the baseline to an amplitude other than zero.

Overshoot

The short term pulse excursion (or transient) above the pulse top or below the baseline, which is simultaneous to the leading or trailing edge of the pulse.



DUTY FACTOR = PULSE DURATION/PULSE PERIOD

Period

The time interval for a full pulse cycle, inverse of frequency or repetition rate, or the interval between corresponding pulse amplitudes of two consecutive undelayed or delayed pulses. Generally measured between the 50% amplitude levels of two consecutive pulses.

Polarity

The direction from the baseline of the pulse excursion, either positive-going or negative-going.

Preshoot

A transient excursion that precedes the step function. It may be of the same or opposite polarity as the pulse.

Ringing

Periodic aberrations that dampen in time, following overshoot.

Risetime

The time interval for the pulse to rise from the 10% to 90% amplitude levels.

Rounding or Undershoot

The rounding of the pulse corners at the edges of a step function.

Tilt or Slope

A distortion of an otherwise flat-topped pulse, characterized by either a decline or a rise of the pulse top (see Flatness).

Width

The time interval between the leading and trailing edge 50% pulse amplitude time.